



02-08-00

A
JC511 U.S. PTO
09/499562
02/07/00Patent Application Transmittal

(only for new nonprovisional applications under 37 C.F.R. 1.53(b))

Correspondence Address:
FROMMER LAWRENCE & HAUG LLP
745 FIFTH AVENUE
NEW YORK, NEW YORK 10151
TEL: (212) 588-0800
FAX: (212) 588-0500

Date: February 7, 2000Attorney Docket No.: 450100-02333

ASSISTANT COMMISSIONER FOR PATENTS
Box Patent Application
Washington, D.C. 20231

Sir:

With reference to the filing in the United States Patent and Trademark Office of an application for patent in the name(s) of:

Mitsuhiro SUZUKI, Kazuyuki SAKODA

entitled:

COMMUNICATION APPARATUS, COMMUNICATION SYSTEM, AND METHOD OF THE SAME

The following are enclosed:

Specification (54 pages)
 8 Sheet(s) of Drawings
 39 Claim(s) (including 11 independent claim(s))
 This application contains a multiple dependent claim
 Our check for \$ 1656.00, calculated on the basis of the claims as amended by any enclosed preliminary amendment as follows:

Basic Fee, \$690.00 (\$345.00)	\$ 690.00
Number of Claims in excess of 20 at \$18.00 (\$9.00) each:	19 . . .	342.00
Number of Independent Claims in excess of 3 at \$78.00 (\$39.00) each:	8	624.00
Multiple Dependent Claim Fee at \$260.00 (\$130.00)	-0-
Total Filing Fee	\$ 1656.00
Assignment Recording Fee \$40.00	-0-

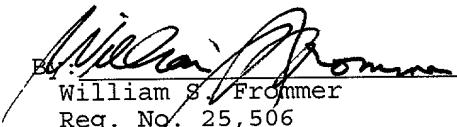
Oath or Declaration and Power of Attorney
 New signed unsigned
 Copy from a prior application (37 C.F.R. 1.63(d))
 Certified copy of each of the following application(s) to substantiate the claim(s) for priority made in the Declaration:

<u>Application No.</u>	<u>Filed</u>	<u>In</u>
11-031877	9 February 1999	Japan

Please charge any additional fees required for the filing of this application or credit any overpayment to Deposit Account No. 50-0320.

Respectfully submitted,

FROMMER LAWRENCE & HAUG LLP
Attorneys for Applicants


By: William S. Frommer
William S. Frommer
Reg. No. 25,506

FROMMER LAWRENCE & HAUG LLP

745 FIFTH AVENUE NEW YORK, NEW YORK 10151

WILLIAM S. FROMMER
WILLIAM F. LAWRENCE
EDCAR H. HAUG
MATTHEW K. RYAN
BARRY S. WHITE
THOMAS J. KOWALSKI
JOHN R. LANE
DENNIS M. SMID*
DANIEL G. BROWN
BARBARA Z. MORRISSEY
STEVEN M. AMUNDSON
MARILYN MATTHES BROGAN
JAMES K. STRONSKI

A. THOMAS S. SAFFORD
JEROME ROSENSTOCK
RAYMOND R. WITTEKIND, PH.D.
Of Counsel

GORDON KESSLER
MARK W. RUSSELL*
BRUNO POLITO
GRACE L. PAN*
JEFFREY A. HOVDEN
JOE H. SHALLENBURGER
CHRISTIAN M. SMOLIZZA
GLENN F. SAVIT
ROBERT E. COLLETTI
DEXTER T. CHANG
PETER J. WAIBEL*
LINDSEY A. MOHLE
DEENA P. LEVY

*Admitted to a Bar
other than New York

February 7, 2000

Assistant Commissioner for Patents
Washington, D.C. 20231

Re: U.S. Patent Application
Applicants: Mitsuhiro SUZUKI, Kazuyuki SAKODA
Our Ref.: 450100-02333

Dear Sir:

Enclosed are papers constituting the above patent application which is being filed under 37 C.F.R. 1.53 without a signed Declaration. Please accord a filing date and a serial number to such application and inform the undersigned thereof so that a signed Declaration and the surcharge required by 37 C.F.R. 1.16(e) may be duly filed.

Please address all correspondence to:

William S. Frommer, Esq.
FROMMER LAWRENCE & HAUG LLP
745 Fifth Avenue
New York, New York 10151

Respectfully,



William S. Frommer
Reg. No. 25,506
Attorney for Applicants
Enclosures

PATENT
450100-02333

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION FOR LETTERS PATENT

TITLE: COMMUNICATION APPARATUS, COMMUNICATION SYSTEM, AND METHOD OF THE SAME
INVENTORS: Mitsuhiro SUZUKI, Kazuyuki SAKODA

William S. Frommer
Registration No. 25,506
FROMMER LAWRENCE & HAUG LLP
745 Fifth Avenue
New York, New York 10151
Tel. (212) 588-0800

COMMUNICATION APPARATUS, COMMUNICATION SYSTEM,AND METHOD OF THE SAME

5

BACKGROUND OF THE INVENTION**1. Field of the Invention**

The present invention relates to a communication apparatus for receiving a content signal, a communication apparatus for transmitting a content signal, a communication system for transmitting and receiving a content signal, and a method for the same.

2. Description of the Related Art

In recent years, along with the development of the Internet, computer, mobile communications, and other technologies, it has become possible for individual users to obtain a video signal, audio signal, or other variety of content signals upon request when and where needed.

In a conventional communication system using the Internet and mobile communications, a specific communication line established by using an ISDN (integrated services digital network), a cellular system using up and down channels, or another communication medium enabling two-way communication is used for transmitting a content request signal from a terminal of

a user to a server and for transmitting a content signal in accordance with the content request signal from the server to the terminal which sent the content request signal.

5 As explained above, in a conventional communication system, a content signal is sent from a server to a terminal of a user under the condition that the server received a content request signal. Further, transmission of the content signal is performed by 10 individually establishing a communication line (assigning a channel) between the server and the terminal which sent the content request signal.

15 In the above conventional communication system, however, since transmission of a content signal from the server to the terminal is performed by individually establishing a communication line between the terminal which sent the content signal and the server, it becomes difficult to assign communication lines to terminals of 20 all users demanding communication in a time zone where, for example, many users communicate by using their terminals.

25 While one method would be to increase the number of communication lines, since the communication capacity of a communication medium as a whole is limited, when assigning communication lines to many users, there

is a disadvantage that a communication capacity able to be assigned to one user becomes small and the communication time becomes long.

The present invention was made in
5 consideration of the above disadvantages of the prior art
and has as its object to provide a communication
apparatus for receiving a content signal, a communication
system for transmitting a content signal, and a
communication system for receiving and transmitting a
10 content signal capable of reducing the volume of
communication via individually established communication
lines between a server and terminals and a method for the
same.

15 SUMMARY OF THE INVENTION

An object of the present invention is to provide a communication apparatus for receiving a content signal, a communication system for transmitting a content signal, and a communication system for receiving and transmitting a content signal capable of reducing the volume of communication via individually established communication lines between a server and terminals and a method for the same.

To attain the above object, according to a first aspect of the present invention, there is provided a

communication apparatus for receiving a content signal and storing the received content signal, comprising: a reception means for receiving a broadcasted content signal; a memory means for storing the broadcasted content signal received by the reception means; a control means for judging whether or not a specified content signal is stored in the memory means and, when it is judged that it is not stored, generating a content request signal for requesting the specified content signal; and a transmission means for transmitting the generated content request signal: and wherein, the reception means also receives a content signal in accordance with the transmitted content request signal.

In the communication apparatus according to the first aspect of the present invention, the broadcasted content signal is stored in the memory means after being received by the reception means.

Then, in a control means, it is judged whether or not a content signal specified by, for example, a user is stored in the memory means, and when judged it is not stored, a content request signal for requesting the specified content signal is generated.

Then, the content request signal is transmitted from a transmission means.

25 Then, a content signal in accordance with the

content request signal is received by the reception means.

Namely, the communication apparatus according to the first aspect of the present invention does not output a content request signal and receive a content signal unconditionally when a content signal is specified. The specified content signal stored in the memory means is used when the specified content signal has already been broadcasted and stored in the memory means.

At this time, since the reception means of the communication apparatus can receive a content signal without individually establishing a communication line with a server of the content signal, by for example the server broadcasting a popular content signal, it becomes unnecessary for many communication apparatuses to individually establish communication lines with the server for receiving the popular content signal. As a result, the volume of the communication using individual communication lines can be largely reduced.

According to a second aspect of the present invention, there is provided a method of communication for receiving a content signal, comprising the steps of: a broad cast reception process for receiving a broadcasted content signal; storing the broadcasted content signal received by the broadcast reception

process; a control process for judging whether or not a specified content signal is stored and generating a content request signal for requesting the specified content signal when it is judged that it is not stored; a 5 transmission process for transmitting the generated content request signal; and an individual reception process for further receiving a content signal response to the transmitted content request signal.

According to a third aspect of the present 10 invention, there is provided a communication apparatus capable of communicating with other plurality of communication apparatuses, comprising: a reception means for receiving a content request signal from the other communication apparatuses; a memory means for storing a 15 content signal; a transmission means for broadcasting a content signal to the plurality of communication apparatuses and transmitting a content signal to the other communication apparatuses which transmitted the content request signal; and a control means for reading a 20 predetermined content signal from the memory means, making the read specified content signal be broadcasted from the transmission means to the plurality of other transmission apparatuses, reading a content signal requested by the content request signal from the memory 25 means when the reception means receives the content

request signal, and making the read content signal be transmitted from the transmission means to the other communication apparatuses which transmitted the content request signal.

5 According to a fourth aspect of the present invention, there is provided a communication apparatus capable of communicating with a plurality of other communication apparatuses, comprising: a reception means for receiving a content request signal from the other communication apparatuses; a transmission means for transmitting a content signal to the other communication apparatuses which transmitted the content request signal; and a control means for generating a control signal to make a content signal requested much be broadcasted by a broadcast device based on the content request signal and transmitting to a broadcast device.

10

15

According to a fifth aspect of the present invention, there is provided a method of communication for transmitting a content signal to a plurality of other communication apparatuses, comprising the steps of: a reception process for receiving a content request signal from the other communication apparatus; a transmission process for transmitting a content signal to the other communication apparatuses which transmitted the content request signal; and a control process for generating a

20

25

control signal to make a content signal requested much be broadcasted by a broadcast device based on the content request signal and transmitting to a broadcast device.

According to a sixth aspect of the present invention, there is provided a communication apparatus capable of communicating with a plurality of other communication apparatuses according to a fourth aspect of the present invention, comprising: a reception means for receiving from a communication station a broadcast request signal for requesting to broadcast a content signal requested much by other communication apparatuses generated based on a content request signal for requesting a content from the plurality of other communication apparatuses to the communication station; and a broadcast means for broadcasting a content signal based on the broadcast request signal to the plurality of other communication apparatuses.

According to a seventh aspect of the present invention, there is provided a method of communication for broadcasting a content signal to a plurality of other communication apparatuses, comprising the steps of: a reception process for receiving from a communication station a broadcast request signal for requesting to broadcast a content signal requested much by other communication apparatuses generated based on a content

request signal for requesting a content from the plurality of other communication apparatuses to the communication station; and a broadcast process for broadcasting a content signal based on the broadcast request signal to the plurality of other communication apparatuses.

According to the eighth invention there is provided a communication system having a first communication apparatus for providing a content signal and one or more second communication apparatuses for being provided with the content signal, wherein: the first communication apparatus, comprising: a first reception means for receiving a content request signal from the second communication apparatus; a first memory means for storing a content signal; a first transmission means for broadcasting a content signal to the plurality of second communication apparatuses and transmitting a content signal to the second communication apparatus which transmitted the content request signal; a first control means for reading a predetermined content signal from the memory means, making the read predetermined content signal be broadcasted from the transmission means to the plurality of second communication apparatuses, reading a content signal requested by the content request signal from the memory means when the reception means receives

the content request signal, and making the read content signal be transmitted from the transmission means to the second communication apparatus which transmitted the content request signal; and the second communication apparatus comprises: a second reception means for receiving a broadcasted content signal and also a content signal in accordance with the content request signal; a second memory means for storing the broadcasted content signal received by the reception means; a second control means for judging whether or not a specified content signal is stored in the memory means and, when it is judged that it is not stored, generating a content request signal for requesting the specified content signal; and a second transmission means for transmitting the generated content request signal.

According to a ninth aspect of the present invention, there is provided a method of communication performed between a first communication apparatus for providing a content signal and one or more second communication apparatuses for being provided with the content signal, comprising the steps of: broadcasting a predetermined content signal from the first communication apparatus to the one or more second communication apparatuses; storing the broadcasted predetermined content signal in each the second communication

apparatus; judging whether or not a specified content signal is stored in a the second communication apparatus and transmitting the content request signal for requesting the specified content signal from a second communication apparatus to the first communication apparatus when it is judged that it is not stored; and transmitting a content signal in accordance with the content request signal from the first communication apparatus to the second communication apparatus which transmitted the content request signal.

According to a tenth aspect of the present invention, there is provided a communication apparatus, comprising: a first reception means for receiving a broadcasted content signal; a memory means for storing said broadcasted content signal received by said first reception means; a control means for judging whether or not a specified content signal is stored in said memory means and, when it is judged that it is not stored, generating a content request signal for requesting said specified content signal; a transmission means for transmitting said generated content request signal; and a second reception means for receiving a content signal in accordance with said transmitted content request signal by a lower bit rate compared with that of said first reception means.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and features of the present invention will become clearer from the following 5 description of the preferred embodiments given with reference to the accompanying drawings, in which:

Fig. 1 is a view of the configuration of a communication system according to a first embodiment of the present invention;

10 Fig. 2 is a view for explaining an example of the numbers of base stations and terminals shown in Fig. 1;

Fig. 3 is a view of the internal configurations of the blocks shown in Fig. 1;

15 Fig. 4 is a flow chart for explaining processing in accordance with a content play instruction signal in a main control unit shown in Fig. 1;

Fig. 5 is a view of the configuration of a communication system of a second embodiment of the present invention;

20 Fig. 6 is a view for explaining a transmission form of a content signal in the communication system shown in Fig. 5;

Fig. 7 is a view of the configuration of a communication system of a third embodiment of the present 25 invention; and

Fig. 8 is a view of the internal configurations of the blocks shown in Fig. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 Below, preferred embodiments will be described with reference to the accompanying drawings.

Communication systems according to embodiments of the present invention will be explained below.

First Embodiment

10 Figure 1 is a view of the configuration of a communication system 1 of the present embodiment, Fig. 2 is a view for explaining an example of the numbers of base stations and terminals shown in Fig. 1, and Fig. 3 is a view of the internal configurations of the blocks 15 shown in Fig. 1.

As shown in Fig. 1, the communication system 1 comprises a cellular base station 2, a broadcast base station 3, and a terminal 4.

20 Here, bidirectional cellular communication using a cellular network 5 is performed between the cellular base station 2, the broadcast base station 3, and the terminal 4. Also, broadcasting using a broadcast network 6 is performed from the broadcast station 3 to the terminal 4.

25 Note that there may be any number of cellular base stations 2, broadcast base stations 3, and terminals 4.

Normally, as shown in Fig. 2, a plurality of terminals 4(1) to 4(7) are connected to one cellular base station 2 and broadcast base station 3.

Also, in Fig. 2, the terminals 4(1) to 4(7) have 5 the same configuration with that of the later explained terminal 4.

[Cellular Network 5]

In the cellular network 5, for example, a frequency bandwidth of 800 MHZ is used, a service area is comprised 10 by a plurality of cells, the wireless access method is the TDD (time division duplex) mode, and the modulation format is QPSK (quadrature phase shift keying).

Here, in communication via the cellular network 5, bidirectional communication is performed between 15 communication nodes. Call control for assigning a channel in accordance with an occurrence of a call between the communication nodes (individually connecting the communication lines), position registration control for registering a position of a communication node when the 20 communication node moves geographically, cell switching control during communication enabling transition of cells during communication, and end conversation control for disconnecting the channel in accordance with an end of the call are performed.

25 Note that in the present embodiment, the cellular

base station 2, the broadcast base station 3, and the terminal 4 correspond to communication nodes.

Also, in the example shown in Fig. 2, a channel is assigned only between the cellular base station 2 and the terminal 4(3) via the cellular network 5.

5

[Broadcast Network 6]

10

In the broadcast network 6, for example, a frequency bandwidth of 2 to 5 MHZ is used, a service area is comprised by a plurality of cells, and the modulation format is QPSK (quadrature phase shift keying).

15

In communication via the broadcast network 6, one-way communication only from the broadcast base station 3 to the terminal 4 is performed. Namely, broadcasting of an encrypted content signal S3 from the broadcast base station 3 to the terminal 4 is performed.

20

Further, at this time, an individual channel is not assigned between the broadcast base station 3 and the terminal 4. For example as shown in Fig. 2, the content signal broadcasted by the broadcast base station 3 is received by all terminals 4(1) to 4(7).

Note that as the broadcast network 6, for example, digital television broadcasting of a ground wave having a higher bit rate compared with the cellular network 5 is used.

25

Also, in the present embodiment, the content signal

may be any signal such as a video signal, an audio signal, or a computer program.

The components shown in Fig. 1 will be explained below.

5 [Cellular Base Station 2]

As shown in Fig. 3, the cellular base station 2 comprises a cellular control unit 21, a cellular receiving unit 22, a memory 23, a cellular transmitting unit 24, and a main control unit.

10 The cellular control unit 21 controls the overall cellular communication by the cellular receiving unit 22 and the cellular transmitting unit 24. Specifically, the cellular control unit 21 performs wireless management such as zone (cell) selection and wireless line setting, 15 mobile management such as position registration and authentication, and call control such as signal transmission and signal reception.

20 The cellular receiving unit 22 outputs a content request signal S4a and a key data request signal S4b received from the terminal 4 via the cellular network 5 to the main control unit 25 under the control of the cellular control unit 21.

25 The memory 23 stores a content signal to be transmitted to the terminal 4, data for authentication of a subscriber, and key data via the cellular network 5.

The cellular transmitting unit 24 transmits a content signal S2a and a key data signal S2b read from the memory 23 under the control of the main control unit 25 via the cellular network 5 under the control of the 5 cellular control unit 21. Namely, the cellular transmitting unit 24 individually connects a communication line with the terminal 4 which sent the content request signal S4a and transmits the content signal S2a and the key data signal S2b only to the 10 terminal 4.

Further, the cellular transmitting unit 24 transmits a broadcast instruction signal S2c input from the main control unit 25 to the broadcast base station 3 via the cellular network 5.

15 The main control unit 25 controls the overall processing of the cellular base station 2.

Specifically, when a content request signal S4a is input from the cellular receiving unit 22, the main control unit 25 performs an authentication procedure to 20 judge if the user is a subscriber or not based on data for identifying the user included in the content request signal S4a, and when it judges it to be a subscriber, reads the content signal S2a requested by the content request signal S4a from the memory 23 and outputs it to 25 the cellular transmitting unit 24.

Also, when the key data request signal S4b is input from the cellular receiving unit 22, the main control unit 25 performs an authentication procedure to judge if the user is a subscriber or not based on data for identifying the user included in the key data request signal S4b, and when it judges it to be a subscriber, reads the key data S2b requested by the key data request signal S4b from the memory 23 and outputs it to the cellular transmitting unit 24. The main control unit 25 performs charging processing etc. in accordance with need, for example, after outputting the key data S2b.

Note that in the charging processing, for example, bidirectional communication is performed with the terminal 4 by using the cellular network 5 for a procedure of questions and answers on payment methods etc.

Further, the main control unit 25 specifies a frequently requested content signal, that is, a popular content signal, based on the content request signal S4a and outputs a broadcast instruction signal S2c for instructing broadcast of the specified content signal to the cellular transmitting unit 24. The broadcast instruction signal S2c is transmitted from the cellular transmitting unit 24 to the broadcast base station 3 via the cellular network 5.

[Broadcast Base Station 3]

As shown in Fig. 3, the broadcast base station 3 comprises a memory 31, an encrypting unit 32, a broadcast transmitting unit 33, a main control unit 34, and a 5 cellular receiving unit 35.

The memory 31 stores a content signal to be broadcasted via the broadcast network 6.

The encrypting unit 32 encrypts the content signal S31 read from the memory 31 and outputs the encrypted 10 content signal S3 to the broadcast transmitting unit 33 under the control of the main control unit 34.

The broadcast transmitting unit 33 transmits the encrypted content signal S3 input from the encrypting unit 32 to terminals via the broadcast network 6 under 15 the control of the main control unit 34. Namely, the broadcast transmitting unit 33 transmits the content signal S3 to an unspecified large number of terminals 4.

The cellular receiving unit 35 outputs the broadcast instruction signal S2c received from the 20 cellular base station 2 to the main control unit 34 via the cellular network 5.

The main control unit 34 controls the overall processing of the broadcast base station 3.

The main control unit 34 reads a content signal of 25 a program for which it predicts the cellular base station

2 will receive a content request signal S4a from a large number of subscribers and outputs it to the encrypting unit 32 as a content signal S31.

Further, when the broadcast instruction signal S2c
5 is input from the cellular base station 2, the main control unit 34 reads the content signal indicated by the broadcast instruction signal S2c from the memory 31 in advance and outputs it to the encrypting unit 32 as a content signal S31.

10 [Terminal 4]

As shown in Fig. 3, the terminal 4 comprises a broadcast receiving unit 41, a cellular receiving unit 42, a memory 43, a cellular transmitting unit 44, a cellular control unit 45, a decrypting unit 46, a reproduction unit 47, a main control unit 48, and an operation unit 49.
15

The broadcast receiving unit 41 outputs the content signal S3 received from the broadcast base station 3 to the memory 43 via the broadcast network 6 under the control of the main control unit 48.
20

The cellular receiving unit 42 outputs an nondecrypted content signal S2a received from the cellular base station 2 through an individually established communication line via the cellular network 5 to the decrypting unit 46 under the control of the main
25

control unit 48.

Also, the cellular receiving unit 42 outputs the key data S2b received from the cellular base station 2 through an individually established communication line 5 via the cellular network 5 to the recoding unit 46 under the control of the main control unit 48.

The memory 43 stores the encrypted content signal S3 input from the broadcast receiving unit 41.

The cellular transmitting unit 44 transmits the content request signal S4a and the key data request signal S4b input from the main control unit 48 to the cellular base station 2 via the cellular network 5.

The cellular control unit 45 controls the overall cellular communication by the cellular receiving unit 42 and the cellular transmitting unit 44. Specifically, the cellular control unit 45 performs wireless management such as zone selection and wireless line setting, mobile management such as position registration and authentication, and call control such as signal transmission and signal reception in the same way as in the above cellular control unit 21.

The decrypting unit 46 decrypts the content signal S43 read from the memory 43 by using the key data S2b input from the cellular receiving unit 42 to generate a content signal S46 and outputs the content signal S46 to

the reproduction unit 47.

The reproduction unit 47 selectively receives as input the content signal S46 from the memory 43 and the content signal S2a from the cellular receiving unit 42 and outputs a video or audio in accordance with the input content signal respectively to a display and a speaker.

The operation unit 49 has at least one operation means such as a keyboard, mouse, and buttons and outputs a content play instruction signal S49 specifying the content the user wishes to have played to the main control unit 48 in accordance with a user's operation.

The main control unit 48 controls the overall processing of the terminal 4.

Figure 4 is a flow chart for explaining the processing carried out in accordance with the content play instruction signal in the main control unit 48.

Step S1: The main control unit 48 judges whether or not the content play instruction signal S49 has been input from the operation unit 49 and, when judging that it is input, executes the processing of Step S2 is executed, while when otherwise, repeats the processing of Step S1.

Step S2: The main control unit 48 judges whether or not the content signal specified to be played by the content play instruction signal S49 input at Step S1 is

stored in the memory 43 by referring to, for example, a management table. Namely, it judges whether or not the content signal instructed to be played has already been broadcasted from the broadcast base station 3 via the broadcast network 6.

The main control unit 48 executes the processing of Step S3 when it judges that the content signal instructed to be played is stored in the memory 43 while, when otherwise, executes the processing of Step S4.

Step S3: The main control unit 48 outputs the key data request signal S4b for requesting key data for decrypting the content signal (an encrypted content signal stored in the memory 43) instructed to be played by the content play instruction signal S49 to the cellular transmitting unit 44.

At this time, the key data request signal S4b includes data for specifying the content signal to be decrypted and data of ID and a PIN code for specifying the subscriber etc.

Step S4: The main control unit 48 reads the content signal instructed to be played from the memory 43 and outputs it to the decrypting unit 46.

Step S5: The main control unit 48 outputs the content request signal S4a for requesting the content signal instructed to be played by the content play

instruction signal S49 to the cellular transmitting unit 44.

Below, the overall operation of the communication system 1 shown in Fig. 1 will be explained.

5 First, the broadcast base station 3 reads from the memory 31 in advance a content signal S31, for which it is predicted that many users will wish to view and outputs it to the encrypting unit 32 under the control of the main control unit 34.

10 Then, it encrypts the content signal S31 in the encrypting unit 32 to generate a content signal S3 which it broadcasts to a large number of terminals 4 via the broadcast network 6.

15 Then, the content signal S3 is received by the broadcast receiving unit 41 of the terminal and stored in the memory 43.

20 Next, the operations explained below are carried out between the cellular base station 2 and a terminal 4 based on a content play instruction signal S49 generated in accordance with operation of the operation unit 49 by the user.

25 Below, the operation carried out between the cellular base station 2 and a terminal 4 will be separately explained for cases of whether or not the content signal instructed to be played by the content

play instruction signal S49 is stored in the memory 43.

[First Example of Operation]

In the first example of operation, the operation when the content signal instructed to be played by the content play instruction signal S49 is stored in the memory 43 will be explained.

The operation unit 49 of the terminal 4 is operated by a user and the content play instruction signal S49 specifying the content the user wishes to view (be played) is output from the operation unit 49 to the main control unit 48.

Then, in the main control unit 48, the content signal of the content specified by the content play instruction signal S49 is judged to be stored in the memory 43 (Steps S1 and S2 shown in Fig. 4).

Then, the key data request signal S4b to request key data for decrypting the content signal instructed to be played by the content play instruction signal S49 is transmitted from the main control unit 48 to the cellular transmitting unit 44 (Step S3 shown in Fig. 4), and the key data request signal S4b is received by the cellular receiving unit 22 of the cellular base station 2 via the cellular network 5.

The key data request signal S4b received by the cellular receiving unit 22 is output to the main control

unit 25, the user authentication procedure is carried out by the main control unit 25, and when it is judged that the user is a subscriber, the key data S2b specified by the key data request signal S4b is read from the memory 5 to the cellular transmitting unit 24.

Then, the key data S2b is transmitted from the cellular transmitting unit 24 to the terminal 4 via the cellular network 5 and received by the cellular receiving unit 42 of the terminal 4.

10 The key data S2b received by the cellular receiving unit 42 is output to the decrypting unit 46.

Further, the content signal of the content specified by the content play instruction signal S49 is read from the memory 43 and output to the decrypting unit 15 46 (Step S4 shown in Fig. 4).

Then, in the decrypting unit 46, the content signal read from the memory 43 is decrypted by using the key data S2b and the decrypted content signal S46 is output to the reproduction unit 47.

20 Then, in the reproduction unit 47, an audio and video in accordance with the content signal S46 is played and output.

[Second Example of Operation]

25 The operation when a content signal instructed to be played by a content play instruction signal S49 is not

stored in the memory 46 will be explained next.

The operation unit 49 of the terminal 4 is operated by a user and a content play instruction signal S49 specifying the contents the user wishes to view (be played) is output from the operation unit 49 to the main control unit 48.

Then, in the main control unit 48, it is judged that the content signal instructed to be played by the content play instruction signal S49 is not stored in the memory 43 (Steps S1 and S2 shown in Fig. 4)

Then, a content request signal S4a to request for the content signal instructed to be played by the content play instruction signal S49 is transmitted from the main control unit 48 to the cellular transmitting unit 44 (Step S5 shown in Fig. 4), and the content request signal S4a is received by the cellular receiving unit 22 of the cellular base station 2 via the cellular network 5.

The content request signal S4a received by the cellular receiving unit 22 is output to the main control unit 25 and subjected to the user authentication procedure by the main control unit 25. When it is judged that the user is a subscriber, the content signal S2a requested by the content request signal S4a is read from the memory 23 to the cellular transmitting unit 24.

Then, the content signal S2a is transmitted from

the cellular transmitting unit 24 to the terminal 4 via the cellular network 5 and received by the cellular receiving unit 42 of the terminal 4.

5 The content signal S2a received by the cellular receiving unit 42 is output to the reproduction unit 47.

In the reproduction unit 47, audio and video in accordance with the content signal S2a is played and output.

10 As explained above, according to the communication system 1, for example, a content signal for which it is predicted that there will be demand from many subscribers is encrypted, broadcasted in advance from the broadcast base station 3 to unspecified large number of terminals 4, and stored in the memory 43 of each terminal.

15 Accordingly, in a terminal 4, when a content signal instructed to be played by the operation of the operation unit 49 by the user has already been broadcasted and stored in the memory 43, it is sufficient to read the content signal from the memory 43. It becomes unnecessary to transmit the content signal from the cellular base 20 station 2 to the terminal 4 or to establish a bidirectional connection (assign a channel) between the cellular base station 2 and the terminal 4 via the cellular network 5.

25 As a result, according to the communication system

1, the number of individually established communication lines can be largely reduced, and it is possible to effectively prevent the state of an insufficient number of the limited channels provided by the cellular network
5 5 (traffic).

Further, since traffic can be suppressed in this way, the amount of communication over each channel can be made larger and the amount of data able to be transmitted and received in a unit time in communication using the
10 channels can be made larger in bidirectional communication via the cellular network 5.

Also, according to the communication system 1, when playing a content signal stored in the memory 43 in the terminal 4, the time from outputting the content play
15 instruction signal S49 until playing the content signal can be made shorter comparing with the case of receiving the content signal S2a from the cellular base station 2 based on a content request signal S4a.

Further, in the communication system 1, the content signal S3 broadcasted from the broadcast base station 3 to the terminal 4 is encrypted. When playing the content signal S3 in the terminal 4, bidirectional communication is performed between the cellular base station 2 and the terminal 4 via the cellular network 5, the key data S2b
25 is received through a predetermined procedure of

authentication and charging, and the content signal S3 is decrypted by using the key data S2b. Therefore, the procedure of authentication of subscribers and charging along with the usage of the content signal can be 5 appropriately carried out and unauthorized usage of the content signal can be prevented.

Further, in the communication system 1, since the content signal S3 is transmitted by using a digital television broadcast using a ground wave, a large volume 10 content signal S3 can be transmitted at a high speed.

In the communication system 1, the cellular base station 2 has the same configuration as existing cellular base stations so the latter can be used as they are.

Modification of First Embodiment

15 For example, in the first embodiment, it is judged in the main control unit 48 shown in Fig. 3 whether or not the content signals S3 and S2a received by the broadcast receiving unit 41 and the cellular receiving unit 42 include uncorrectable error. When there is 20 uncorrectable error, a re-transmit instruction signal for instructing re-transmission of the content signals S3a and S2a including the unit where the uncorrectable error exists may be transmitted to the cellular base station 2 and the broadcast base station 3. In this case, the re-transmit instruction signal is sent from the terminal 4 25

to the broadcast base station 3 via the cellular base station 2.

Also, for example, when there are a plurality of terminals 4(1) to 4(7) as shown in Fig. 2, each of the terminals 4(1) to 4(7) may decide in advance the received content signal S3 to store in the memory 43 and thereby store only the decided content signal S3 in the memory 43. By doing so, the capacity of the memory 43 can be effectively used.

Further, in the first embodiment, an example was explained where a content signal S2a which is not encrypted is transmitted from the cellular base station 2 to the terminal 4 via the cellular network 5, however, an encrypted content signal S2a may be transmitted as well.

In this case, predetermined key data is transmitted from the cellular base station 2 to the terminal 4 via the cellular network 5.

Second Embodiment

In the above first embodiment, an example was explained where the transmission of the content signal 2a in accordance with the content request signal S4a was performed by using the cellular network 5 and where the broadcast of the content signal S3 was performed by using the broadcast network 6. Namely, a case of using channels of different frequency bandwidth between the content

signal 2a and the content signal S3 was explained as an example.

In the present embodiment, a case will be explained where transmission of a content signal in accordance with 5 a content request signal and broadcast of a content signal predicted to be popular are performed by using the same channel.

Figure 5 is a view of the configuration of a communication system 101 of the present embodiment.

As shown in Fig. 5, the communication system 101 comprises a cellular base station 102, a broadcast base station 103, and a terminal 104.

Here, bidirectional cellular communication using the cellular network 5 is performed among the cellular base station 102, broadcast base station 103, and 15 terminal 104. Also, the broadcast from the broadcast base station 103 to the terminal 104 is performed by using the broadcast network 6.

Note that, while not illustrated in Fig. 5, there 20 may be any number of cellular base stations 102, broadcast base stations 103, and terminals 104. Normally a plurality of terminals 104 are provided for one cellular base station 102 and broadcast base station 103.

Further, the cellular network 5 and broadcast 25 network 6 are the same as those shown in Fig. 1 in the

above first embodiment.

The components shown in Fig. 5 will be explained in detail below.

[Cellular Base Station 102]

5 As shown in Fig. 5, the cellular base station 102 comprises a cellular control unit 121, cellular receiving unit 122, memory 123, cellular transmitting unit 124, and main control unit 125.

10 The cellular control unit 121 controls the overall cellular communication by the cellular receiving unit 122 and the cellular transmitting unit 124. Specifically, the cellular control unit 121 performs wireless management such as zone selection and wireless line setting, mobile management such as position registration and authentication, and call control such as signal transmission and signal reception.

15 The cellular receiving unit 122 outputs the content request signal S104a and a key data request signal S104b received from the terminal 104 via the cellular network 5 to the main control unit 125 under the control of the cellular control unit 121.

The memory 123 stores data for performing subscriber authentication and key data.

20 The cellular transmitting unit 124 transmits the key data signal S102b read from the memory 123 under the

control of the main control unit 125 to the terminal 104 via the cellular network 5 under the control of the cellular control unit 121.

Also, the cellular transmitting unit 124 transmits 5 the content request signal S104a and broadcast instruction signal S102c input from the main control unit 125 to the broadcast base station 103 via the cellular network 5.

10 The main control unit 125 controls the overall processing of the cellular base station 102.

Specifically, when the content request signal S104a is input from the cellular receiving unit 122, the main control unit 125 performs an authentication procedure to judge if the user is a subscriber or not based on data 15 for identifying users included in the content request signal S104a, and when it judges it to be a subscriber, outputs the content request signal S104a to the cellular transmitting unit 124.

Also, when a key data request signal S104b is input 20 from the cellular receiving unit 122, the main control unit 125 performs an authentication procedure to judge if the user is a subscriber or not based on data for identifying users included in the key data request signal S104b, and when it judges it to be a subscriber, reads 25 the key data S102b requested by the key data request

signal S104b from the memory 123 and outputs it to the cellular transmitting unit 124. The main control unit 125 performs charging processing in accordance with need, for example, after outputting the key data S102b.

5 Note that in the charging processing, for example, bidirectional communication is performed by using the cellular network 5 with the terminal 4 for a question and answer procedure as to payment methods etc.

10 Also, when a re-transmit instruction signal output from the main control unit 148 of the terminal 104 is input, the main control unit 125 outputs the re-transmit instruction signal to the main control unit 134 of the broadcast base station 103 via the cellular network 5.

15 Also, the main control unit 125 specifies a frequently demanded content signal, that is, a popular content signal, based on the content request signal S104a and outputs a broadcast instruction signal S102c for instructing broadcast of the specified content signal to the cellular transmitting unit 124. The broadcast instruction signal S102c is transmitted from the cellular transmitting unit 124 to the broadcast base station 103 via the cellular network 5.

[Broadcast Base Station 103]

25 As shown in Fig. 5, the broadcast base station 103 comprises a memory 131, an encrypting unit 132, a

transmitting unit 133, a main control unit 134, and a cellular receiving unit 135.

The memory 131 stores a content signal to be transmitted via the broadcast network 6.

5 The encrypting unit 132 encrypts the content signals S131a and S131b read from the memory 131 and outputs the encrypted content signals S103a and S103b to the transmitting unit 133 under the control of the main control unit 134.

10 The cellular receiving unit 135 outputs the content request signal S104a and broadcast instruction signal S102c received from the cellular base station 102 via the cellular network 5.

15 The main control unit 134 controls the overall processing of the broadcast base station 103.

20 When the content request signal S104a is input, the main control unit 134 reads the content signal requested by the content request signal S104a from the memory 131 and outputs it to the encrypting unit 132 as a content signal S131a.

Further, the main control unit 134 reads the content signal of a program for which it is predicted many subscribers will input a content request signal S104a from the memory 131 in advance and outputs it to the encrypting unit 132 as a content signal S131b.

Also, when the broadcast instruction signal S102c is input from the cellular base station 102, the main control unit 134 reads the content signal indicated by the broadcast instruction signal S102c from the memory 5 131 and outputs it to the encrypting unit 132 as a content signal S131b.

Further, when a re-transmit instruction signal output from the main control unit 125 is input, the main control unit 134 reads the content signal indicated by 10 the re-transmit instruction signal from the encrypting unit 132 and outputs it to the transmitting unit 133.

The transmitting unit 133 transmits the encrypted content signals S103a and S103b input from the encrypting unit 132 to the terminal 104 via the broadcast network 6.

15 The transmitting unit 133 uses the same channel for the broadcasting by dividing the content signal S103b to broadcast periods BTCH determined cyclically based on a predetermined timing as shown in Fig. 6 and transmits the content signal S103a during other periods as user communication periods UTCH. Namely, the transmitting unit 20 133 alternately transmits the content signal S103a and S103b using the same channel by dividing it by time.

Also, in the example shown in Fig. 6, the content signal S103b is sent repeatedly in units of content 25 signal S103b(0) to (N-1).

[Terminal 104]

As shown in Fig. 5, the terminal 104 comprises a receiving unit 141, a cellular receiving unit 142, a memory 142, a cellular transmitting unit 144, a cellular control unit 145, a decrypting unit 146, a reproduction unit 47, a main control unit 148, and an operation unit 49.

5 Note that the reproduction unit 47 and the operation unit 49 are the same as the reproduction unit 10 47 and the operation unit 49 shown in Fig. 1 explained in the first embodiment.

15 The receiving unit 141 receives the encrypted content signal S103a transmitted from the broadcast base station 103 via the broadcast network 6 during the user communication periods (UTCH) and outputs the part of the received content signal S103a received at the timing instructed under the control of the main control unit 148 to the memory 143.

20 Specifically, the receiving unit 141 outputs only the content signal S103a in accordance with the content request signal S104a transmitted by the main control unit 148 to the memory 143.

25 Further, the receiving unit 141 receives the encrypted content signal S103b broadcasted from the broadcast base station 103 via the broadcast network 6

and outputs the received content signal S103b to the memory 143.

Note that in the present embodiment, since the same content signal S103b is received a plurality of times at 5 predetermined time intervals by the receiving unit 141, the receiving unit 141 does not output to the memory 143 the same content signal S103b as the content signal S013b stored in the memory 143 without error the previous time.

The memory 143 stores the encrypted content signals 10 S103a and S103b input from the broadcast receiving unit 141.

The cellular receiving unit 142 outputs key data 15 S102b received from the cellular base station 102 via the cellular network 5 to the decrypting unit 46 under the control of the main control unit 148.

The cellular transmission portion 144 transmits to the cellular base station 102 the content request signal S104a input from the main control portion 48 and the key data request signal S104b via the cellular network 5.

The cellular control unit 145 controls the overall 20 cellular communication by the cellular receiving unit 142 and the cellular transmitting unit 144. Specifically, the cellular control unit 145 performs wireless management such as zone selection and wireless line setting, mobile 25 management such as position registration and

authentication, and call control such as signal transmission and signal reception in the same way as in the above cellular control unit 21.

5 The decrypting unit 146 decrypts the content signals S103a and S103b read from the memory 143 by using the key data S102b input from the cellular receiving unit 142 to generate a content signal S146 and outputs the content signal S146 to the reproduction unit 47 under the 10 control of the main control unit 148.

The reproduction unit 47 outputs audio and video in accordance with the content signal S146 input from the decrypting unit 146 respectively to a display and a speaker.

15 The main control unit 148 totally the overall processing of the terminal 104.

The processing carried out in the main control unit 148 in accordance with the content play instruction signal S49 is basically the same as the processing of the 20 main control unit 48 of the first embodiment explained with reference to Fig. 4.

Further, the main control unit 148 detects a transfer error of the content signal S103a received by the receiving unit 141 and, when the transfer error is 25 uncorrectable, outputs a re-transmit instruction signal

for instructing re-transmission of a predetermined size of a block including the uncorrectable unit to the cellular transmitting unit 144.

Also, the main control unit 148 detects transfer
5 error of the content signal S103b received by the receiving unit 141 and, when the transfer error is uncorrectable, rewrites the unit including the transfer error stored in the memory 143 by the received content signal S103b without transfer error when the same content
10 signal S103b is received.

The overall operation of the communication system 101 shown in Fig. 5 will be explained below.

First, in the broadcast base station 103, a content signal S131b for which it is predicted many users will
15 wish to view is read from the memory 131 and output to the encrypting unit 132 under the control of the main control unit 134.

Then, the content signal S131b is encrypted in the encrypting unit 132 to generate a content signal S103b.
20 The content signal S103b is broadcasted from the transmitting unit 133 to the terminal 104 via the broadcast network 6 during the broadcast period BTCH shown in Fig. 6.

The content signal S103b is received by the
25 receiving unit 141 of the terminal 104 and stored in the

memory 143.

Then, the following operation is performed between the cellular base station 102 and the terminal 104 based on a content play instruction signal S49 generated in accordance with the operation of the operation unit by a user.

Below, the operation performed between the cellular base station 102 and the terminal 104 will be separately explained for cases of whether or not the content signal instructed to be played by the content play instruction signal S49 is stored in the memory 143.

[First Example of Operation]

In the first example of operation, an operation when a content signal instructed to be played by a content play instruction signal S49 is stored in the memory 43 will be explained.

The operation unit 49 is operated by a user and a content play instruction signal S49 specifying the content the user wishes to view (be played) is output from the operation unit 49 to the main control unit 148.

Then, the content signal of the content specified by the content play instruction signal S49 is judged to be stored in the memory 143 in the main control unit 148 (Steps S1 and S2 shown in Fig. 4).

Then, a key data request signal S104b for

decrypting the content signal instructed to be played by the content play instruction signal S49 is transmitted from the main control unit 148 to the cellular transmitting unit 144 (Step S3 shown in Fig. 4), and the 5 key data request signal S104b is received by the cellular receiving unit 122 of the cellular base station 102 via the cellular network 5.

The key data request signal S104b received by the cellular receiving unit is output to the main control unit 125, the user authentication procedure is performed in the main control unit 125, and when it is judged that the user is a subscriber, the key data S102b specified by the key data request signal S104b is read from the memory 123 to the cellular transmitting unit 124.

15 Then, the key data S102b is transmitted from the cellular transmitting unit 124 to the terminal 104 via the cellular network 5 and received by the cellular receiving unit 142 of the terminal 104.

The key data S102b received by the cellular receiving unit 142 is output to the decrypting unit 146.

20 Further, the content signal specified by the content play instruction signal S49 is read from the memory 143 and output to the decrypting unit 146 by the main control unit 148 (Step S4 shown in Fig. 4).

25 Then, in the decrypting unit 146, the content

signal read from the memory 143 is decrypted by using the key data S102b and the decrypted content signal S147 is output to the reproduction unit 47.

5 In the reproduction unit 47, audio and video in accordance with the content signal S146 is played and output.

[Second Example of Operation]

10 In the second example of operation, a case where the content signal instructed to be played by the content play instruction signal S49 is not stored in the memory 143 will be explained.

15 The operation unit 49 of the terminal 4 is operated by a user and a content play instruction signal S49 instructing the content the user wishes to view (be played) is output from the operation unit 49 to the main control unit 148.

20 Then, in the main control unit 148, it is judged that the content signal instructed to be played by the content play instruction signal S49 is not stored in the memory 143 (Steps S1 and S2 shown in Fig. 4).

25 Then, a content request signal S104a for requesting the content signal instructed to be played by the content play instruction signal S49 is transmitted from the main control unit 148 to the cellular transmitting unit 144 (Step S5 shown in Fig. 4), and the content request signal

S104a is received by the cellular receiving unit 122 of the cellular base station 102 via the cellular network 5.

The content request signal S104a received by the cellular receiving unit 122 is output to the main control unit 125, the user authentication procedure is performed by the main control unit 125, and when it is judged that the user is a subscriber, the content request signal S104a is output to the cellular transmitting unit 124.

10 The content request signal S104a is transmitted from the cellular transmitting unit 124 to the broadcast base station 103 via the cellular network 5.

15 Also, in the main control unit 125, when it is judged that the user is a subscriber, the key data S102b is read from the memory 123 and output to the cellular transmitting unit 124. The key data S102b is transmitted from the cellular transmitting unit 124 to the terminal 104 via the cellular network 5, received by the cellular receiving unit 142, and output to the decrypting unit 146.

20 On the other hand, the content request signal S104a is received by the cellular receiving unit 135 of the broadcast base station 103 and then output to the main control unit 134, and the content signal requested by the content request signal SS104a is read from the memory 131 to the encrypting unit 132 by the main control unit 134.

The content signal S131a is encrypted by the encrypting unit 132 to generate a content signal S103a, and the content signal S103a is output to the transmitting unit 133.

5 The content signal S103a is transmitted from the transmitting unit 133 to the terminal 104 during the user communication period UTCH shown in Fig. 6 via the broadcast network 6 and received by the receiving unit 141 of the terminal 104.

10 The content signal S103a received by the receiving unit 141 is stored in the memory 143, read out, and output to the decrypting unit 146 under the control of the main control unit 148.

15 Then in the decrypting unit 146, the key data S102b input from the cellular receiving unit 142 is used to decrypt the content signal S103a read from the memory 143 and a content signal S146 is generated.

20 In the reproduction unit 47, audio and video in accordance with the content signal S146 is played and output.

25 As explained above, according to the communication system 101, even when transmission of a content signal in accordance with a content request signal and broadcasting of a content signal predicted to be popular are performed by using the same channel, the same efficiency can be

obtained as in the communication system of the above first embodiment.

In this way, by transmitting a content signal S103a in accordance with the content request signal S104a from 5 the user not via the cellular network 5 but via the broadcast network 6, the communication load on the cellular network can be reduced and it becomes possible to appropriately handle the case where subscribers largely increase.

10 Also, as shown in Fig. 6, since the content signal S103b is repeatedly transmitted, even when a transfer error occurs in the content signal S103b, it is possible to prevent the situation of the cellular base station 102 receiving a large number of re-transmit request signals 15 from a large number of terminals 104.

Third Embodiment

In the present embodiment, a communication system wherein a function of broadcasting a content signal by using a communication satellite (CS) is added to the 20 communication system 101 of the above second embodiment will be explained.

Figure 7 is a view of the configuration of a communication system 201 of the present invention, and Fig. 8 is a view of the inside configurations of the 25 blocks shown in Fig. 7.

As shown in Fig. 7, the communication system 201 comprises a cellular base station 102, a broadcast base station 103a, a terminal 104a, a communication satellite 250, and a set top box 251.

5 Here, bidirectional cellular communication using the network 5 is performed between the broadcast base station 103a and terminal 104a.

10 Note that, while not illustrated in Fig. 7, there may be any number of cellular base stations 102, broadcast base stations 103, terminals 104a, and communication satellites 250. Normally, a plurality of terminals 104a are provided for one cellular base station 102 and one broadcast base station 103a.

15 The set top box 251 is arranged close to the terminal 104a and outputs a content signal from the communication satellite 250 received by an antenna to the terminal 104a.

20 The internal configurations of the components shown in Fig. 7 will be explained in detail below with reference to Fig. 8.

[Cellular Base Station 102]

As shown in Fig. 8, the cellular base station 102 is the same as the cellular base station 102 shown in Fig. 5.

25 [Broadcast Base Station 103a]

As shown in Fig. 8, the broadcast base station 103a comprises a memory 131, an encrypting unit 132, a transmitting unit 133, a main control unit 134a, a cellular receiving unit 135, and a CS transmitting unit 5 270.

Here, the memory 131, encrypting unit 132, transmitting unit 133, and cellular receiving unit 135 are the same as the components having the same reference numerals shown in Fig. 5.

10 Namely, the broadcast base station 103a is configured as the broadcast base station 103 shown in Fig. 5 added with the CS transmitting unit 270 and provided with the main control unit 134a instead of the main control unit 134.

15 The main control unit 134a is the same as the main control unit 134 shown in Fig. 5 explained in the second embodiment except for the following point.

20 Namely, the main control unit 134a outputs a content signal S103a (a content signal transmitted in accordance with an access request signal S104a from a user) and outputs the content signal S103b (a content signal to be broadcasted) to the CS transmitting unit 270.

25 As explained above, the main control unit 134a transmits the content signal S103a from the transmitting

unit 133 to the terminal 104a via the broadcast network 6 using a digital television broadcast of a ground wave and controls the broadcast of the content signal S103b from the CS transmitting unit 270 to the terminal 104a via the 5 communication satellite network 260 using a communication satellite 250.

Also, the CS transmitting unit 270 transmits the content signal S103b input from the encrypting unit 132 to the communication satellite 250 via the communication 10 satellite network 260.

[Communication Satellite 250]

The communication satellite 250 comprises a CS receiving unit 271 and a CS transmitting unit 272.

The CS receiving unit 271 amplifies and filters the 15 content signal S103b received from the broadcast base station 103a and outputs it to the CS transmitting unit 272.

The CS transmitting unit 272 converts the content signal S103 input from the CS receiving unit 271 to a 20 transmission frequency and transmits the same.

[Set Top Box 251]

The set top box 251 comprises a CS receiving unit 273.

The CS receiving unit 273 outputs to the terminal 25 104a the content signal S103b received from the

communication satellite 250 after performing predetermined processing.

[Terminal 104a]

As shown in Fig. 8, the terminal 104a comprises a receiving unit 141, a cellular receiving unit 142, a memory 143, a cellular transmitting unit 144, a cellular control unit 145, a decrypting unit 146, a reproduction unit 47, a main control unit 148a, and an operation unit 49.

Here, the receiving unit 141, cellular receiving unit 142, memory 143, cellular transmitting unit 144, cellular control unit 145, decrypting unit 146, reproduction unit 47, and operation unit 49 are the same as the components having the same reference numerals shown in Fig. 5 of the above first embodiment.

Also, the main control unit 148a is the same as the main control unit 148 of the above first embodiment except for the following point.

Namely, the main control unit 148a stores in the memory 143 a content signal S103a received by the receiving unit 141 and stores in the memory 143 the content signal input from the set top box 251.

The operation of the communication system 201 is the same as that of the communication system 101 of the above second embodiment except that the content signal

S103a is transmitted to the terminal 4 via the broadcast network 6 and that the content signal S103b is broadcasted to the terminal 4 via the communication satellite network 260.

5

As explained above, according to the communication system 201, the content signal S103b is broadcasted via the communication network 260. Therefore, the content signal S103b received by a large number of terminals can be transmitted at a high bit rate (high speed) and at a low error rate (high reliability). Also, in the communication network 260, since a broad service area can be secured, the content signal S103b can be broadcasted to a large number of terminals 4 arranged in a wide area.

15

Further, according to the communication system 201, the content signal S103a is transmitted via the broadcast network 6 having a cell structure using a ground wave by receiving the content request signal S104a from the respective users. Therefore, the content signal S103a can be transmitted by specifying a cell and it becomes possible to individually respond to content request signals from a large number of users by establishing a large number of communication lines (channels).

20

25

The present invention is not limited by the above embodiments.

For example, the present invention may use a bidirectional communication network such as wired networks like ISDN and satellite telephone line networks instead of the cellular network 5 in the above embodiment. Also, the broadcast network 6 may use communication lines using, for example, communication lines of cable television and multimedia access control (MMAC) systems other than ground waves.

As explained above, according to the communication apparatus of the embodiments, when an already broadcasted content signal is specified, since it is sufficient to read the broadcasted content signal from the memory means, it is possible to reduce the frequency of transmission of a content request signal and the frequency of individually reception of a content signal in accordance with the content request signal and therefore the amount of communication can be reduced.

Also, according to a communication apparatus of the embodiments, in addition to transmitting the content signal in accordance with the content request signal from the second transmission means, by broadcasting a predetermined content signal from the first transmission means, the frequency of receiving a content request signal for requesting the broadcasted content signal can be reduced. Further, the frequency of individually

transmitting the content signal to other communication apparatuses can be reduced. As a result, the amount of communication can be made smaller.

Also, according to the communication system and
5 method of the present invention, the amount of communication between a first communication apparatus and a second communication apparatus can be made smaller.

While the invention has been described with reference to specific embodiment chosen for purpose of
10 illustration, it should be apparent that numerous modifications could be made thereto by those skilled in the art without departing from the basic concept and scope of the invention.

What is claimed is:

1. A communication apparatus for receiving a content signal and storing the received content signal, comprising:

5 a reception means for receiving a broadcasted content signal;

a memory means for storing said broadcasted content signal received by said reception means;

10 a control means for judging whether or not a specified content signal is stored in said memory means and, when it is judged that it is not stored, generating a content request signal for requesting said specified content signal; and

15 a transmission means for transmitting said generated content request signal:

said reception means further receiving a content signal response to said transmitted content request signal.

2. A communication apparatus as set forth in
20 claim 1, further comprising:

an output means for performing at least one of a video output and an audio output in accordance with the content signal;

25 wherein said control means reads said specified content signal from said memory means and

outputs it to said output means when it is judged that said specified content signal is stored in said memory means.

3. A communication apparatus as set forth in
5 claim 1, further comprising:

an output means for performing at least one of a video output and an audio output in accordance with a content signal;

wherein:

10 said control means outputs said specified content signal received by said reception means in accordance with said content request signal to said output means when it is judged that said specified content signal is not stored in said memory means.

15 4. A communication apparatus as set forth in
claim 1, further comprising:

a decryption means for decrypting said content signal read from said memory means by using key data when said broadcasted content signal is encrypted;

20 wherein:

said control means generates a key data request signal for requesting said key data when it is judged that said specified content signal is stored in said memory means;

25 said transmission means transmits said key

data request signal; and

 said reception means outputs said key data received in accordance with said key data request signal to said decryption means.

5. A communication apparatus as set forth in claim 1, wherein:

 said control means judges whether or not an uncorrectable error exists in said broadcasted content signal received by said reception means and, when it is 10 judged that an uncorrectable error exists, generates a re-transmit instruction signal for instructing to re-transmit the broadcasted content signal; and

 said transmission means transmits said re-transmit instruction signal.

15. A communication apparatus as set forth in claim 1, wherein said reception means comprises:

 a first reception means for receiving said broadcasted content signal; and

20. a second reception means for receiving a content signal in accordance with said transmitted content request signal via a different communication line from that in said first communication means.

7. A communication apparatus as set forth in claim 6, wherein:

25. said transmission means uses a communication

line individually established with another party to transmit said content request signal to said another party; and

5 said second reception means uses a communication line individually established with said other party to receive a content signal from said other party in accordance with said content request signal.

8. A communication apparatus as set forth in claim 7, wherein said transmission means receives said 10 content request signal via a communication line capable of bidirectional communication the same as the communication line for transmitting said content signal transmitted by said second transmission means.

9. A communication apparatus as set forth in 15 claim 6, wherein:

 said transmission means and said second reception means perform communication relating to at least one of procedures of authentication and charging with said other party.

20 10. A communication apparatus as set forth in claim 1, wherein

 said reception means receives said broadcasted content signal and a content signal in accordance with said transmitted content request signal 25 from the same communication lines by time division.

11. A communication apparatus as set forth in
claim 6, wherein said first reception means receives said
content signal via a communication medium having a larger
communication capacity than a communication medium for
5 transmitting said content signal received by said second
reception means.

12. A communication apparatus as set forth in
claim 1, wherein said reception means and said
transmission means perform transmission of said content
10 request signal and reception of a content signal in
accordance with said content request signal by wireless
communication capable of bidirectional communication by a
cell mode.

13. A communication apparatus as set forth in
15 claim 1, wherein said reception means receives said
broadcasted content signal by using a ground wave or a
satellite.

14. A communication apparatus as set forth in
claim 6, wherein said first reception means receives said
20 broadcasted content signal by using a satellite; and
said second reception means receives a
content signal in accordance with said content request
signal by using a ground wave.

15. A method of communication for receiving a
25 content signal, comprising:

a broad cast reception process for receiving
a broadcasted content signal;

a storing process for storing said
broadcasted content signal received by said broadcast
reception process;

a control process for judging whether or not a specified content signal is stored and generating a content request signal for requesting said specified content signal when it is judged that it is not stored;

10 a transmission process for transmitting said generated content request signal; and

an individual reception process for also receiving a content signal in accordance with said transmitted content request signal.

15 16. A communication apparatus capable of
communicating with other plurality of communication
apparatuses, comprising:

a reception means for receiving a content
request signal from said other communication apparatuses;

20 a memory means for storing a content signal;
a transmission means for broadcasting a
content signal to said plurality of communication
apparatuses and transmitting a content signal to said
other communication apparatuses which transmitted said
content request signal; and
25

a control means for reading a predetermined content signal from said memory means, making the read specified content signal be broadcasted from said transmission means to said plurality of other 5 transmission apparatuses, reading a content signal requested by the content request signal from said memory means when said reception means receives said content request signal, and making the read content signal be transmitted from said transmission means to said other 10 communication apparatuses which transmitted said content request signal.

17. A communication apparatus as set forth in claim 16, further comprising an encrypting means for encrypting a content signal;

15 wherein said control means makes said encrypting means encrypt said predetermined content signal read from said memory means and makes said first transmission means broadcast the encrypted content signal to said plurality of other communication apparatuses.

20 18. A communication apparatus as set forth in claim 16, wherein:

25 said reception means further receives a key data request signal for requesting key data via communication lines individually established with said other communication apparatuses;

5
said memory means further stores the key data for decrypting a content signal encrypted by said encryption means; and

10
15
said control means reads the key data requested by said key data request signal received by said reception means from said memory means and makes the read key data be transmitted from said transmission means to said other communication apparatuses which transmitted said key data request signal.

20
25
19. A communication apparatus as set forth in claim 16, wherein said transmission means comprises:
a first transmission means for broadcasting a content signal to said plurality of communication apparatuses; and

30
35
a second transmission means for transmitting a content signal to said other communication apparatuses which transmitted the content request signal via a different communication line from that in said first communication means.

40
45
20. A communication apparatus as set forth in claim 19, wherein:

50
55
said reception means receives said content request signal from said other communication apparatuses via communication lines individually established with said other communication apparatuses; and

60
65
25
70
75
80
85
90
95
100
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
185
190
195
200
205
210
215
220
225
230
235
240
245
250
255
260
265
270
275
280
285
290
295
300
305
310
315
320
325
330
335
340
345
350
355
360
365
370
375
380
385
390
395
400
405
410
415
420
425
430
435
440
445
450
455
460
465
470
475
480
485
490
495
500
505
510
515
520
525
530
535
540
545
550
555
560
565
570
575
580
585
590
595
600
605
610
615
620
625
630
635
640
645
650
655
660
665
670
675
680
685
690
695
700
705
710
715
720
725
730
735
740
745
750
755
760
765
770
775
780
785
790
795
800
805
810
815
820
825
830
835
840
845
850
855
860
865
870
875
880
885
890
895
900
905
910
915
920
925
930
935
940
945
950
955
960
965
970
975
980
985
990
995
1000
1005
1010
1015
1020
1025
1030
1035
1040
1045
1050
1055
1060
1065
1070
1075
1080
1085
1090
1095
1100
1105
1110
1115
1120
1125
1130
1135
1140
1145
1150
1155
1160
1165
1170
1175
1180
1185
1190
1195
1200
1205
1210
1215
1220
1225
1230
1235
1240
1245
1250
1255
1260
1265
1270
1275
1280
1285
1290
1295
1300
1305
1310
1315
1320
1325
1330
1335
1340
1345
1350
1355
1360
1365
1370
1375
1380
1385
1390
1395
1400
1405
1410
1415
1420
1425
1430
1435
1440
1445
1450
1455
1460
1465
1470
1475
1480
1485
1490
1495
1500
1505
1510
1515
1520
1525
1530
1535
1540
1545
1550
1555
1560
1565
1570
1575
1580
1585
1590
1595
1600
1605
1610
1615
1620
1625
1630
1635
1640
1645
1650
1655
1660
1665
1670
1675
1680
1685
1690
1695
1700
1705
1710
1715
1720
1725
1730
1735
1740
1745
1750
1755
1760
1765
1770
1775
1780
1785
1790
1795
1800
1805
1810
1815
1820
1825
1830
1835
1840
1845
1850
1855
1860
1865
1870
1875
1880
1885
1890
1895
1900
1905
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
2095
2100
2105
2110
2115
2120
2125
2130
2135
2140
2145
2150
2155
2160
2165
2170
2175
2180
2185
2190
2195
2200
2205
2210
2215
2220
2225
2230
2235
2240
2245
2250
2255
2260
2265
2270
2275
2280
2285
2290
2295
2300
2305
2310
2315
2320
2325
2330
2335
2340
2345
2350
2355
2360
2365
2370
2375
2380
2385
2390
2395
2400
2405
2410
2415
2420
2425
2430
2435
2440
2445
2450
2455
2460
2465
2470
2475
2480
2485
2490
2495
2500
2505
2510
2515
2520
2525
2530
2535
2540
2545
2550
2555
2560
2565
2570
2575
2580
2585
2590
2595
2600
2605
2610
2615
2620
2625
2630
2635
2640
2645
2650
2655
2660
2665
2670
2675
2680
2685
2690
2695
2700
2705
2710
2715
2720
2725
2730
2735
2740
2745
2750
2755
2760
2765
2770
2775
2780
2785
2790
2795
2800
2805
2810
2815
2820
2825
2830
2835
2840
2845
2850
2855
2860
2865
2870
2875
2880
2885
2890
2895
2900
2905
2910
2915
2920
2925
2930
2935
2940
2945
2950
2955
2960
2965
2970
2975
2980
2985
2990
2995
3000
3005
3010
3015
3020
3025
3030
3035
3040
3045
3050
3055
3060
3065
3070
3075
3080
3085
3090
3095
3100
3105
3110
3115
3120
3125
3130
3135
3140
3145
3150
3155
3160
3165
3170
3175
3180
3185
3190
3195
3200
3205
3210
3215
3220
3225
3230
3235
3240
3245
3250
3255
3260
3265
3270
3275
3280
3285
3290
3295
3300
3305
3310
3315
3320
3325
3330
3335
3340
3345
3350
3355
3360
3365
3370
3375
3380
3385
3390
3395
3400
3405
3410
3415
3420
3425
3430
3435
3440
3445
3450
3455
3460
3465
3470
3475
3480
3485
3490
3495
3500
3505
3510
3515
3520
3525
3530
3535
3540
3545
3550
3555
3560
3565
3570
3575
3580
3585
3590
3595
3600
3605
3610
3615
3620
3625
3630
3635
3640
3645
3650
3655
3660
3665
3670
3675
3680
3685
3690
3695
3700
3705
3710
3715
3720
3725
3730
3735
3740
3745
3750
3755
3760
3765
3770
3775
3780
3785
3790
3795
3800
3805
3810
3815
3820
3825
3830
3835
3840
3845
3850
3855
3860
3865
3870
3875
3880
3885
3890
3895
3900
3905
3910
3915
3920
3925
3930
3935
3940
3945
3950
3955
3960
3965
3970
3975
3980
3985
3990
3995
4000
4005
4010
4015
4020
4025
4030
4035
4040
4045
4050
4055
4060
4065
4070
4075
4080
4085
4090
4095
4100
4105
4110
4115
4120
4125
4130
4135
4140
4145
4150
4155
4160
4165
4170
4175
4180
4185
4190
4195
4200
4205
4210
4215
4220
4225
4230
4235
4240
4245
4250
4255
4260
4265
4270
4275
4280
4285
4290
4295
4300
4305
4310
4315
4320
4325
4330
4335
4340
4345
4350
4355
4360
4365
4370
4375
4380
4385
4390
4395
4400
4405
4410
4415
4420
4425
4430
4435
4440
4445
4450
4455
4460
4465
4470
4475
4480
4485
4490
4495
4500
4505
4510
4515
4520
4525
4530
4535
4540
4545
4550
4555
4560
4565
4570
4575
4580
4585
4590
4595
4600
4605
4610
4615
4620
4625
4630
4635
4640
4645
4650
4655
4660
4665
4670
4675
4680
4685
4690
4695
4700
4705
4710
4715
4720
4725
4730
4735
4740
4745
4750
4755
4760
4765
4770
4775
4780
4785
4790
4795
4800
4805
4810
4815
4820
4825
4830
4835
4840
4845
4850
4855
4860
4865
4870
4875
4880
4885
4890
4895
4900
4905
4910
4915
4920
4925
4930
4935
4940
4945
4950
4955
4960
4965
4970
4975
4980
4985
4990
4995
5000
5005
5010
5015
5020
5025
5030
5035
5040
5045
5050
5055
5060
5065
5070
5075
5080
5085
5090
5095
5100
5105
5110
5115
5120
5125
5130
5135
5140
5145
5150
5155
5160
5165
5170
5175
5180
5185
5190
5195
5200
5205
5210
5215
5220
5225
5230
5235
5240
5245
5250
5255
5260
5265
5270
5275
5280
5285
5290
5295
5300
5305
5310
5315
5320
5325
5330
5335
5340
5345
5350
5355
5360
5365
5370
5375
5380
5385
5390
5395
5400
5405
5410
5415
5420
5425
5430
5435
5440
5445
5450
5455
5460
5465
5470
5475
5480
5485
5490
5495
5500
5505
5510
5515
5520
5525
5530
5535
5540
5545
5550
5555
5560
5565
5570
5575
5580
5585
5590
5595
5600
5605
5610
5615
5620
5625
5630
5635
5640
5645
5650
5655
5660
5665
5670
5675
5680
5685
5690
5695
5700
5705
5710
5715
5720
5725
5730
5735
5740
5745
5750
5755
5760
5765
5770
5775
5780
5785
5790
5795
5800
5805
5810
5815
5820
5825
5830
5835
5840
5845
5850
5855
5860
5865
5870
5875
5880
5885
5890
5895
5900
5905
5910
5915
5920
5925
5930
5935
5940
5945
5950
5955
5960
5965
5970
5975
5980
5985
5990
5995
6000
6005
6010
6015
6020
6025
6030
6035
6040
6045
6050
6055
6060
6065
6070
6075
6080
6085
6090
6095
6100
6105
6110
6115
6120
6125
6130
6135
6140
6145
6150
6155
6160
6165
6170
6175
6180
6185
6190
6195
6200
6205
6210
6215
6220
6225
6230
6235
6240
6245
6250
6255
6260
6265
6270
6275
6280
6285
6290
6295
6300
6305
6310
6315
6320
6325
6330
6335
6340
6345
6350
6355
6360
6365
6370
6375
6380
6385
6390
6395
6400
6405
6410
6415
6420
6425
6430
6435
6440
6445
6450
6455
6460
6465
6470
6475
6480
6485
6490
6495
6500
6505
6510
6515
6520
6525
6530
6535
6540
6545
6550
6555
6560
6565
6570
6575
6580
6585
6590
6595
6600
6605
6610
6615
6620
6625
6630
6635
6640
6645
6650
6655
6660
6665
6670
6675
6680
6685
6690
6695
6700
6705
6710
6715
6720
6725
6730
6735
6740
6745
6750
6755
6760
6765
6770
6775
6780
6785
6790
6795
6800
6805
6810
6815
6820
6825
6830
6835
6840
6845
6850
6855
6860
6865
6870
6875
6880
6885
6890
6895
6900
6905
6910
6915
6920
6925
6930
6935
6940
6945
6950
6955
6960
6965
6970
6975
6980
6985
6990
6995
7000
7005
7010
7015
7020
7025
7030
7035
7040
7045
7050
7055
7060
7065
7070
7075
7080
7085
7090
7095
7100
7105
7110
7115
7120
7125
7130
7135
7140
7145
7150
7155
7160
7165
7170
7175
7180
7185
7190
7195
7200
7205
7210
7215
7220
7225
7230
7235
7240
7245
7250
7255
7260
7265
7270
7275
7280
7285
7290
7295
7300
7305
7310
7315
7320
7325
7330
7335
7340
7345
7350
7355
7360
7365
7370
7375
7380
7385
7390
7395
7400
7405
7410
7415
7420
7425
7430
7435
7440
7445
7450
7455
7460
7465
7470
7475
7480
7485
7490
7495
7500
7505
7510
7515
7520
7525
7530
7535
7540
7545
7550
7555
7560
7565
7570
7575
7580
7585
7590
7595
7600
7605
7610
7615
7620
7625
7630
7635
7640
7645
7650
7655
7660
7665
7670
7675
7680
7685
7690
7695
7700
7705
7710
7715
7720
7725
7730
7735
7740
7745
7750
7755
7760
7765
7770
7775
7780
7785
7790
7795
7800
7805
7810
7815
7820
7825
7830
7835
7840
7845
7850
7855
7860
7865
7870
7875
7880
7885
7890
7895
7900
7905
7910
7915
7920
7925
7930
7935
7940
7945
7950
7955
7960
7965
7970
7975
7980
7985
7990
7995
8000
8005
8010
8015
8020
8025
8030
8035
8040
8045
8050
8055
8060
8065
8070
8075
8080
8085
8090
8095
8100
8105
8110
8115
8120
8125
8130
8135
8140
8145
8150
8155
8160
8165
8170
8175
8180
8185
8190
8195
8200
8205
8210
8215
8220
8225
8230
8235
8240
8245
8250
8255
8260
8265
8270
8275
8280
8285
8290
8295
8300
8305
8310
8315
8320
8325
8330
8335
8340
8345
8350
8355
8360
8365
8370
8375
8380
8385
8390
8395
8400
8405
8410
8415
8420
8425
8430
8435
8440
8445
8450
8455
8460
8465
8470
8475
8480
8485
8490
8495
8500
8505
8510
8515
8520
8525
8530
8535
8540
8545
8550
8555
8560
8565
8570
8575
8580
8585
8590
8595
8600
8605
8610
8615
8620
8625
8630
8635
8640
8645
8650
8655
8660
8665
8670
8675
8680
8685
8690
8695
8700
8705
8710
8715
8720
8725
8730
8735
8740
8745
8750
8755
8760
8765
8770
8775
8780
8785
8790
8795
8800
8805
8810
8815
8820
8825
8830
8835
8840
8845
8850
8855
8860
8865
8870
8875
8880
8885
8890
8895
8900
8905
8910
8915
8920
8925
8930
8935
8940
8945
8950
8955
8960
8965
8970
8975
8980
8985
8990
8995
9000
9005
9010
9015
9020
9025
9030
9035
9040
9045
9050
9055
9060
9065
9070
9075
9080
9085
9090
9095
9100
9105
9110
9115
9120
9125
9130
9135
9140
9145
9150
9155
9160
9165
9170
9175
9180
9185
9190
9195
9200
9205
9210
9215
9220
9225
9230
9235
9240
9245
9250
9255
9260
9265
9270
9275
9280
9285
9290
9295
9300
9305

50
said second transmission means transmits said content signal by individually establishing communication lines with said other communication apparatuses which transmitted said content request signal.

5 21. A communication apparatus as set forth in claim 20, wherein said reception means and said second transmission means perform communication relating to at least one procedure of authentication and charging with said other communication apparatuses.

10 22. A communication apparatus as set forth in claim 19, wherein said reception means receives said content request signal via a communication line capable of bidirectional communication the same as the communication line for transmitting said content signal
15 transmitted by said second transmission means.

20 23. A communication apparatus as set forth in claim 16, wherein
said transmission means transmits a content signal to be broadcasted to said plurality of communication apparatuses and a content signal based on said content request signal via the same communication lines by time division.

25 24. A communication apparatus as set forth in claim 19, wherein said first transmission means broadcasts said predetermined content signal via a

communication medium having a larger communication capacity than a communication medium for transferring said content signal transmitted by said second transmission means.

5 25. A communication apparatus as set forth in
claim 19, wherein said second transmission means and said
reception means perform transmission of said content
signal and reception of said content request signal by
wireless communication capable of bidirectional
10 communication by a cell mode.

26. A communication apparatus as set forth in
claim 19, wherein said first transmission means
broadcasts said predetermined content signal by using a
ground wave or a satellite.

15 27. A communication apparatus as set forth in
claim 19, wherein:

 said first transmission means broadcasts said
predetermined content signal by using a satellite; and
 said second transmission means transmits a
20 content signal in accordance with said content request
signal by using a ground wave.

28. A communication apparatus as set forth in
claim 16, wherein

 said transmission means transmits a content
25 signal requested much to a plurality of communication

apparatuses by broadcasting based on said content request signal received by said reception means.

29. A method of communication for transmitting a content signal to other communication apparatuses, comprising:

a reception process for receiving a content request signal from said other communication apparatuses;

a broadcast process for broadcasting a predetermined content signal to said plurality of other communication apparatuses; and

an individual transmission process for transmitting a content signal requested by the content request signal to said other communication apparatuses which transmitted said content request signal when said reception process receives said content request signal.

30. A communication apparatus capable of communicating with a plurality of other communication apparatuses, comprising:

a reception means for receiving a content request signal from said other communication apparatuses;

a transmission means for transmitting a content signal to said other communication apparatuses which transmitted said content request signal; and

a control means for generating a control signal to make a content signal requested much be

broadcasted by a broadcast device based on said content request signal and transmitting to a broadcast device.

31. A method of communication for transmitting a content signal to a plurality of other communication apparatuses, comprising:

a reception process for receiving a content request signal from said other communication apparatus;

a transmission process for transmitting a content signal to said other communication apparatuses which transmitted said content request signal; and

a control process for generating a control signal to make a content signal requested much be broadcasted by a broadcast device based on said content request signal and transmitting to a broadcast device.

32. A communication apparatus capable of communicating with a plurality of other communication apparatuses, comprising:

a reception means for receiving from a communication station a broadcast request signal for requesting to broadcast a content signal requested much by other communication apparatuses generated based on a content request signal for requesting a content from said plurality of other communication apparatuses to the communication station; and

a broadcast means for broadcasting a content

signal based on said broadcast request signal to said plurality of other communication apparatuses.

33. A method of communication for broadcasting a content signal to a plurality of other communication apparatuses, comprising:

10 a reception process for receiving from a communication station a broadcast request signal for requesting to broadcast a content signal requested much by other communication apparatuses generated based on a content request signal for requesting a content from said plurality of other communication apparatuses to the communication station; and

15 a broadcast process for broadcasting a content signal based on said broadcast request signal to said plurality of other communication apparatuses.

34. A communication system having a first communication apparatus for providing a content signal and one or more second communication apparatuses for being provided with said content signal, wherein:

20 said first communication apparatus,
comprising:

a first reception means for receiving a content request signal from said second communication apparatus;

25 a first memory means for storing a

content signal;

a first transmission means for

broadcasting a content signal to said plurality of second communication apparatuses and transmitting a content

5 signal to said second communication apparatus which
transmitted said content request signal;

a first control means for reading a

predetermined content signal from said memory means,

making the read predetermined content signal be

10 broadcasted from said transmission means to said

plurality of second communication apparatuses, reading a content signal requested by the content request signal

from said memory means when said reception means receives said content request signal, and making the read content

15 signal be transmitted from said transmission means to
said second communication apparatus which transmitted
said content request signal; and

said second communication apparatus

comprises:

20 a second reception means for receiving
a broadcasted content signal and also a content signal in
accordance with said content request signal;

a second memory means for storing said
broadcasted content signal received by said reception

25

a second control means for judging
whether or not a specified content signal is stored in
said memory means and, when it is judged that it is not
stored, generating a content request signal for
5 requesting said specified content signal; and

A second transmission means for
transmitting said generated content request signal.

35. A communication system as set forth in claim
34, wherein:

10 said first transmission means of said first
communication apparatus transmits said content signal to
said second communication apparatus individually
connected to communication lines among said plurality of
second communication apparatuses.

15 36. A method of communication performed between a
first communication apparatus for providing a content
signal and one or more second communication apparatuses
for being provided with said content signal, comprising
the steps of:

20 broadcasting a predetermined content signal
from said first communication apparatus to said one or
more second communication apparatuses;

25 storing said broadcasted predetermined
content signal in each said second communication
apparatus;

judging whether or not a specified content signal is stored in a said second communication apparatus and transmitting said content request signal for requesting said specified content signal from a second communication apparatus to said first communication apparatus when it is judged that it is not stored; and

5 transmitting a content signal in accordance with said content request signal from said first communication apparatus to said second communication apparatus which transmitted said content request signal.

10 37. A method of communication as set forth in claim 36, further comprising the steps of:

15 encrypting and broadcasting said predetermined content signal from said first communication apparatus to each said second communication apparatus and,

when it is judged that said specified content signal is stored in a second communication apparatus,

transmitting a key data request signal for requesting key data for decrypting said encrypted content signal from said second communication apparatus to said first communication apparatus;

transmitting key data in accordance with said key data request signal from said first communication apparatus to said second communication apparatus; and

decrypting a received encrypted content signal by using said received key data in said second communication apparatus.

38. A communication method as set forth in claim 5 37, wherein transmission of said key data request signal and said key data is performed via a communication line individually established between said first communication apparatus and a said second communication apparatus.

39. A communication apparatus, comprising:
10 a first reception means for receiving a broadcasted content signal;
a memory means for storing said broadcasted content signal received by said first reception means;
a control means for judging whether or not a specified content signal is stored in said memory means and, when it is judged that it is not stored, generating a content request signal for requesting said specified content signal;
a transmission means for transmitting said generated content request signal; and
20 a second reception means for receiving a content signal in accordance with said transmitted content request signal by a lower bit rate compared with that of said first reception means.

COMMUNICATION APPARATUS, COMMUNICATION SYSTEM,
AND METHOD OF THE SAME

5

ABSTRACT OF THE DISCLOSURE

A communication apparatus capable of reducing the amount of communication with other communication apparatuses is provided, wherein a content signal of a popular program is broadcasted in advance from a broadcast base station to terminals and stored in a memory of each. In a terminal, when a content signal specified by a play instruction signal is stored in the memory, the content signal is read from the memory. On the other hand, when it is not stored in the memory, the terminal requests the specified content signal from the cellular base station via a cellular network and receives the specified content signal.

20

FIG.1

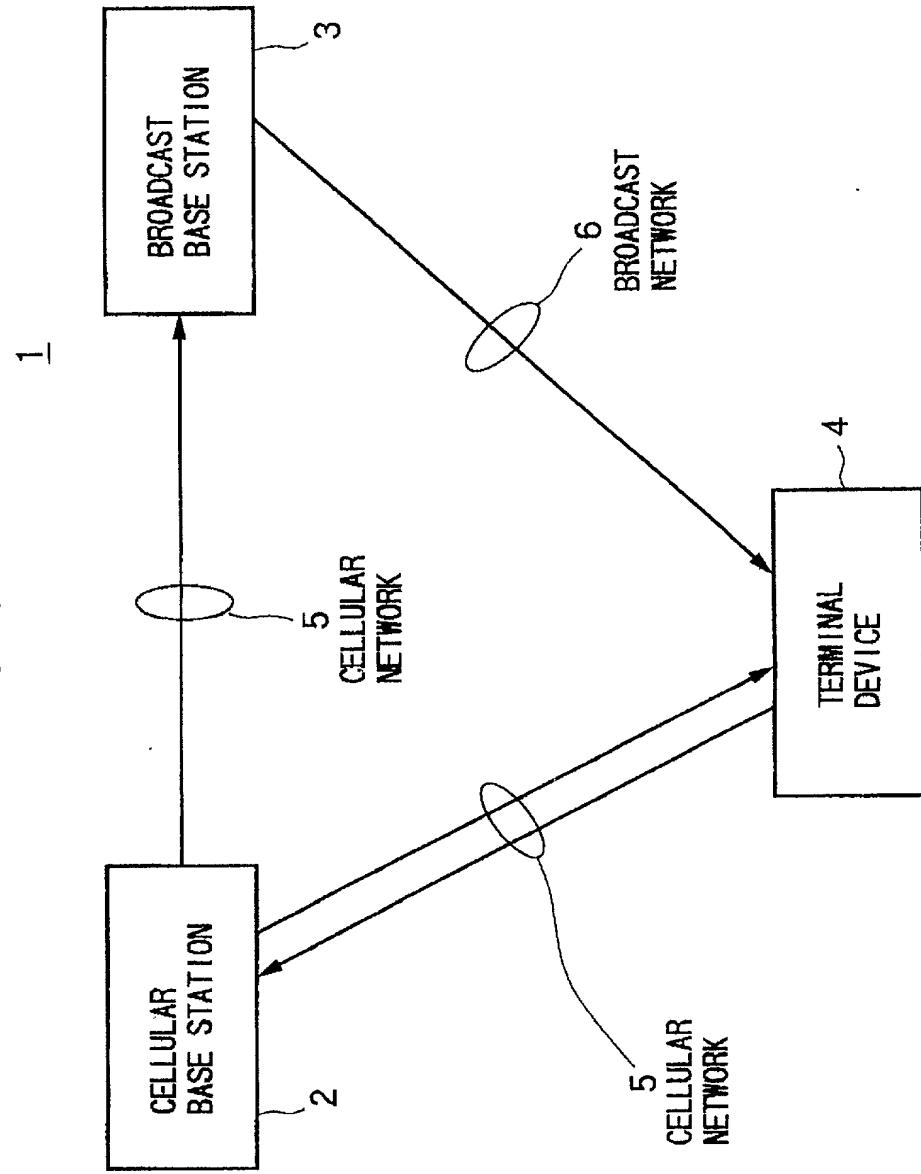


FIG.2

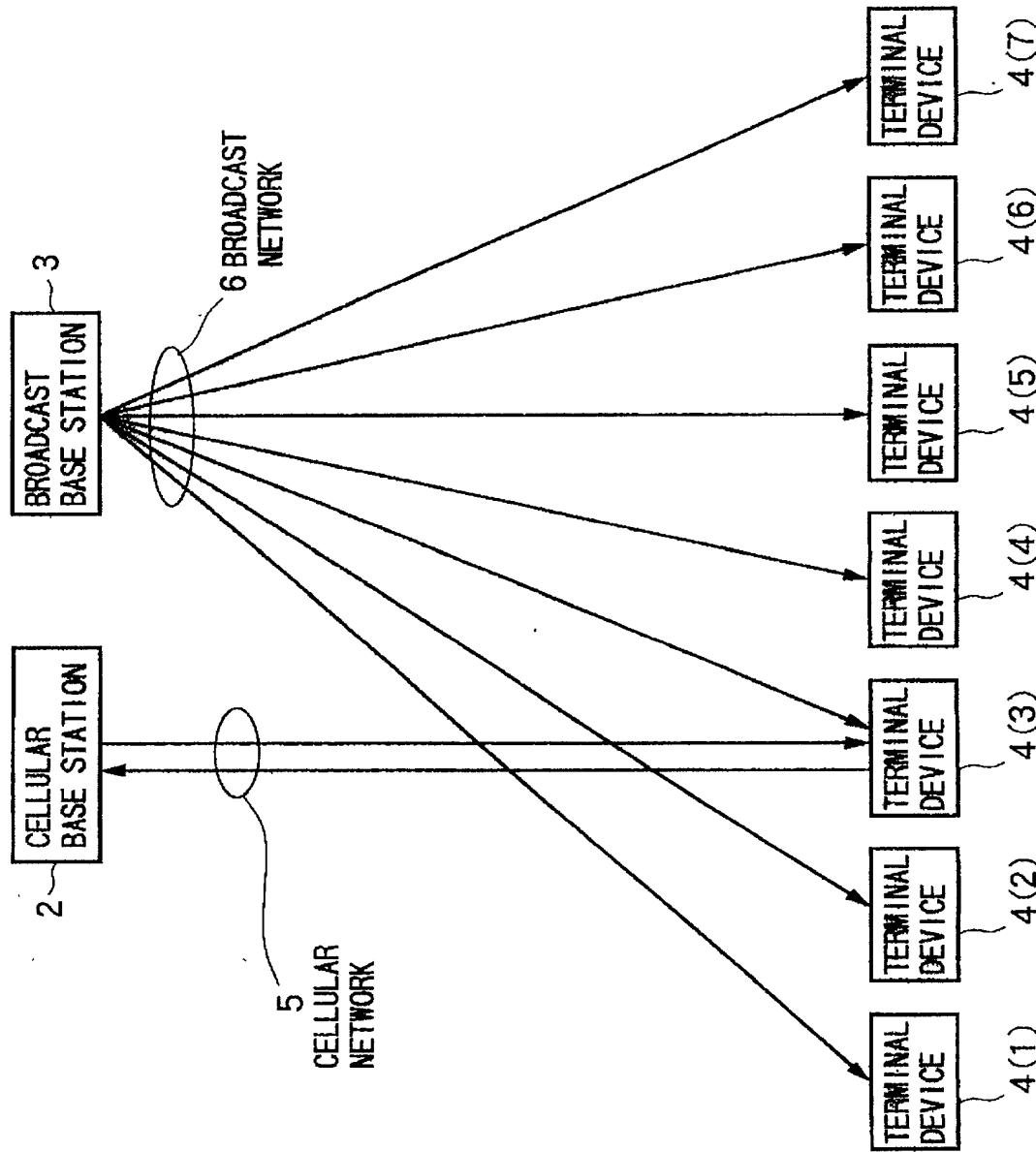


FIG.3

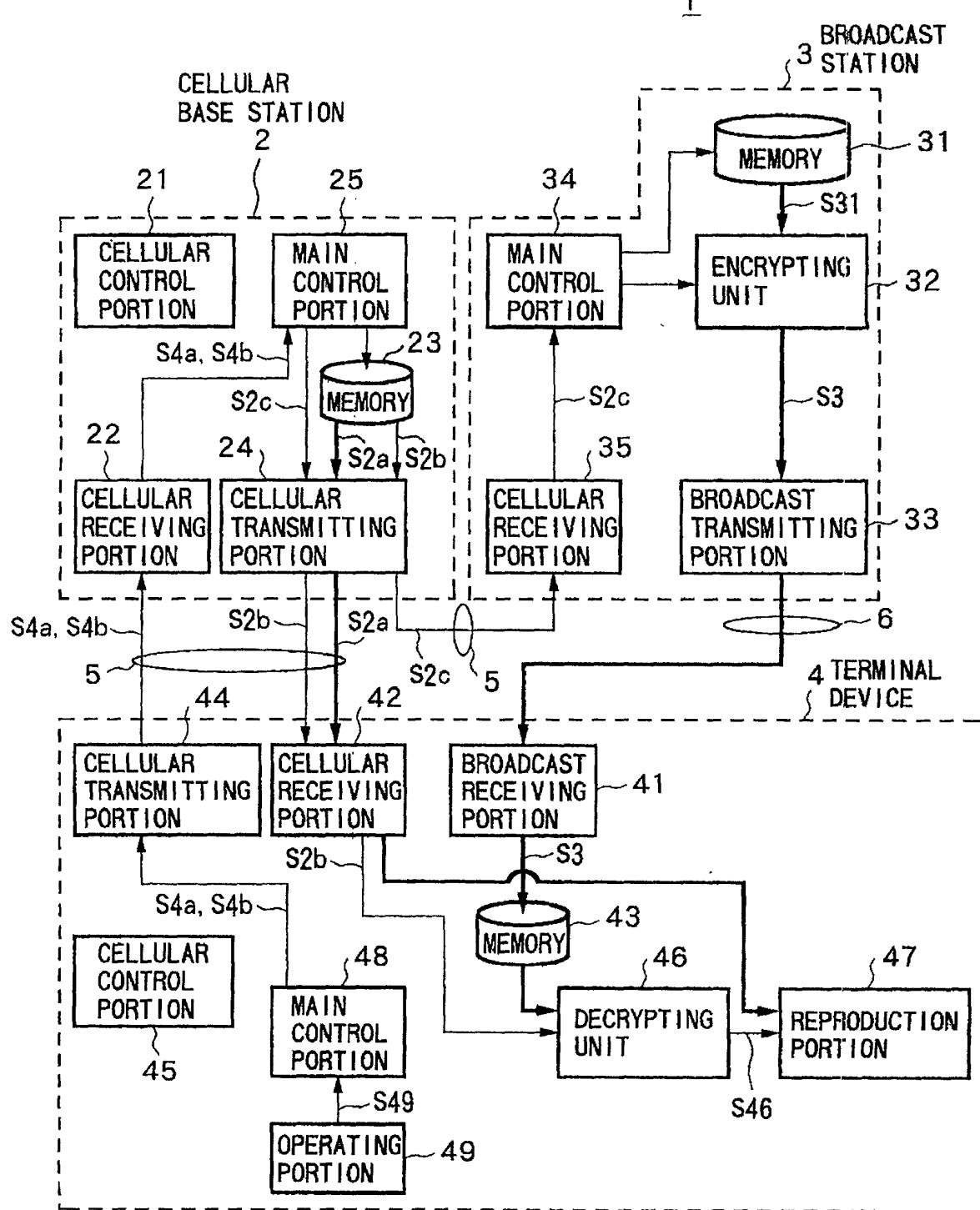


FIG.4

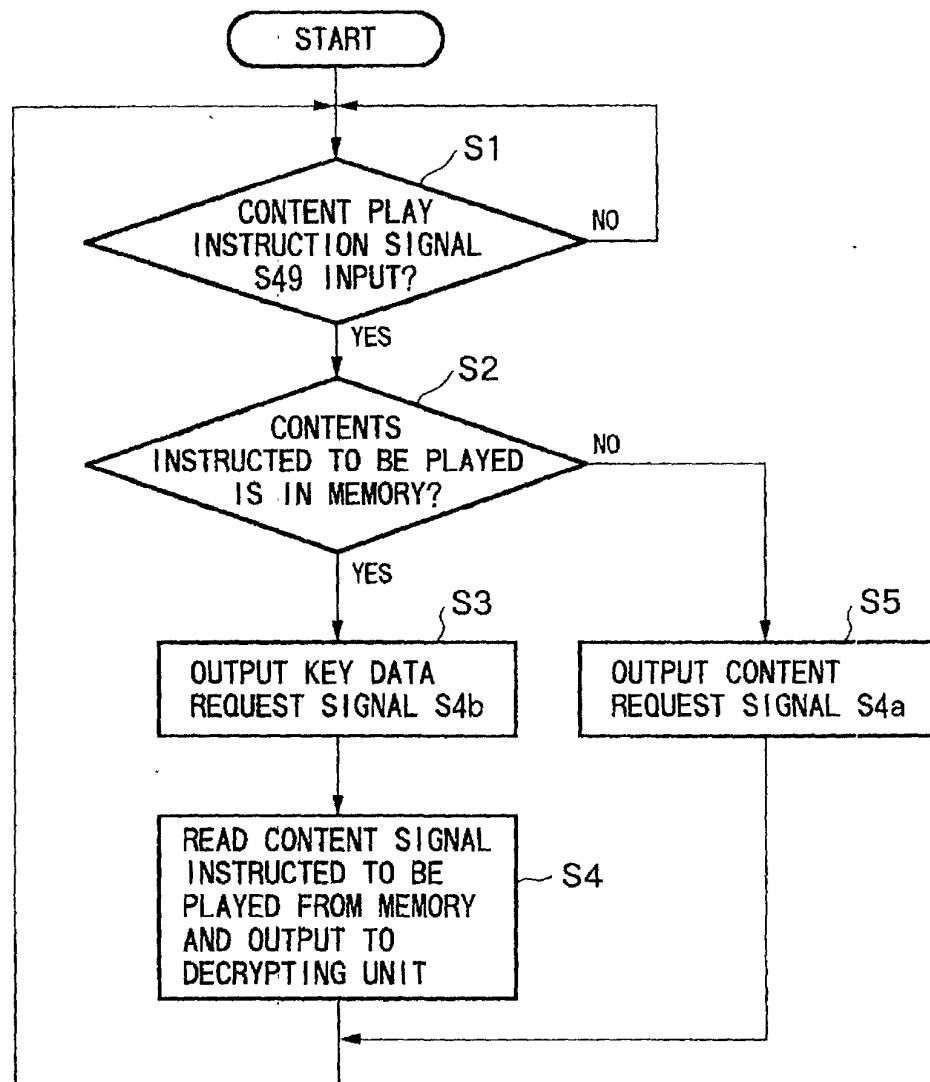


FIG.5

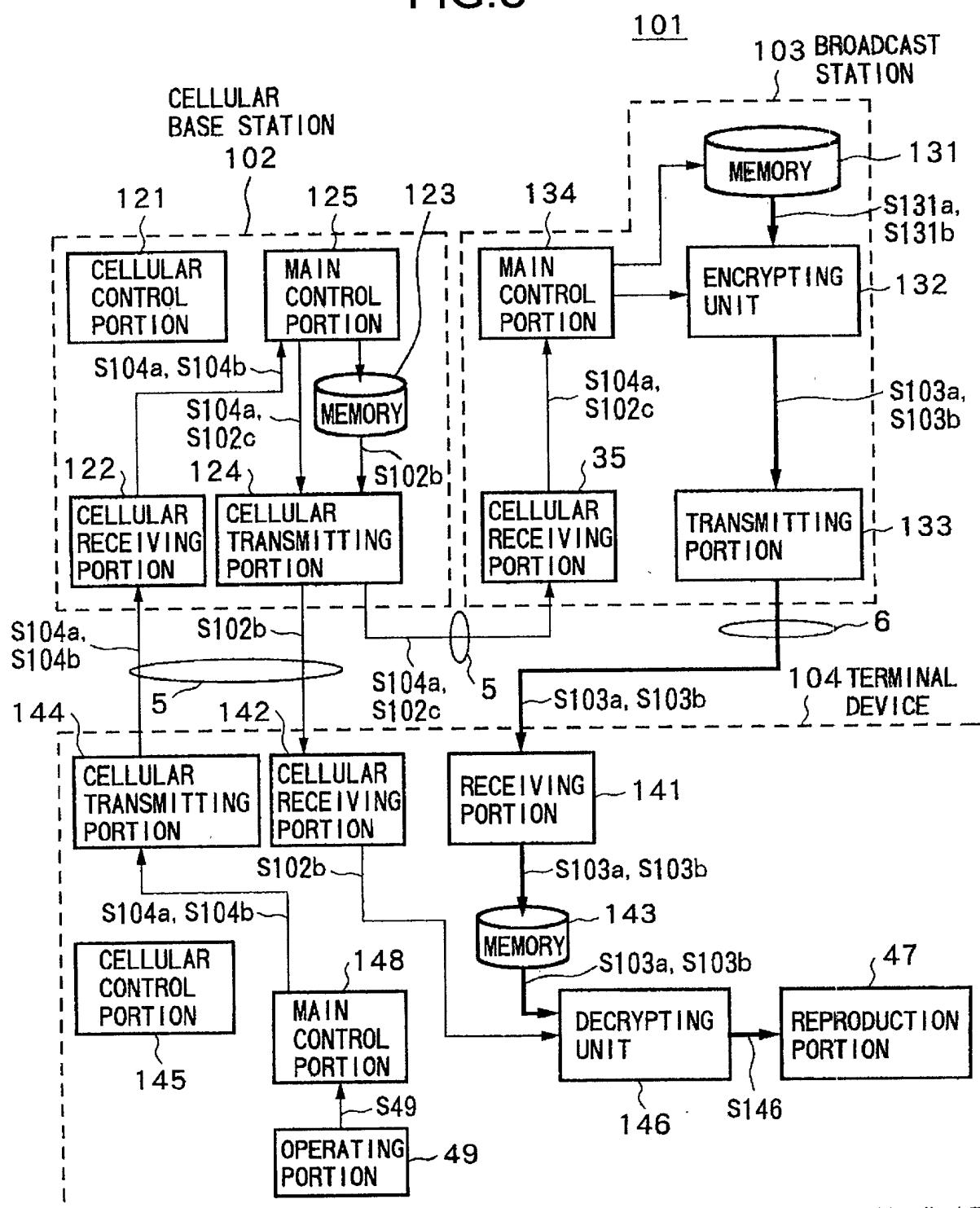


FIG.6

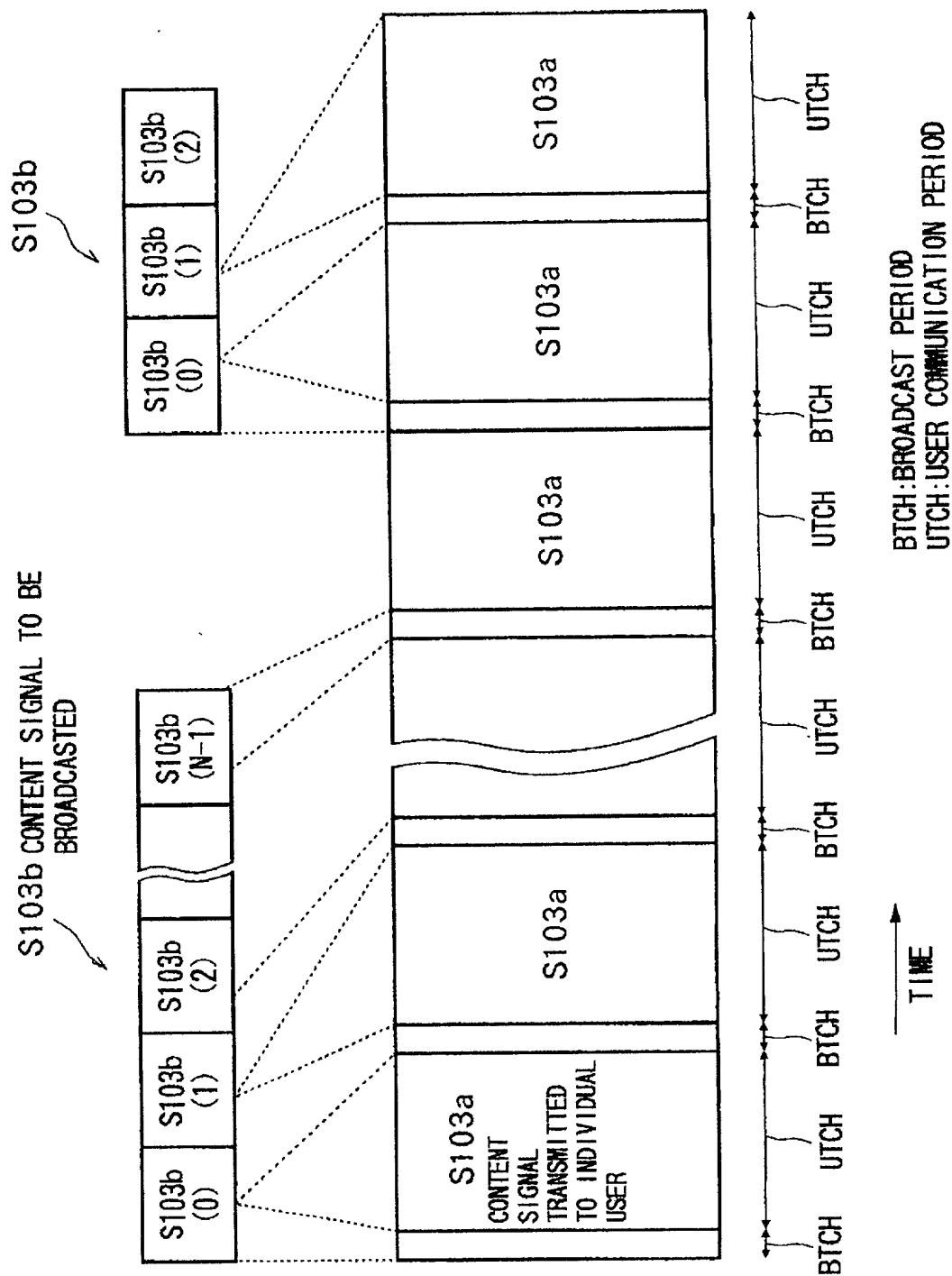


FIG.7

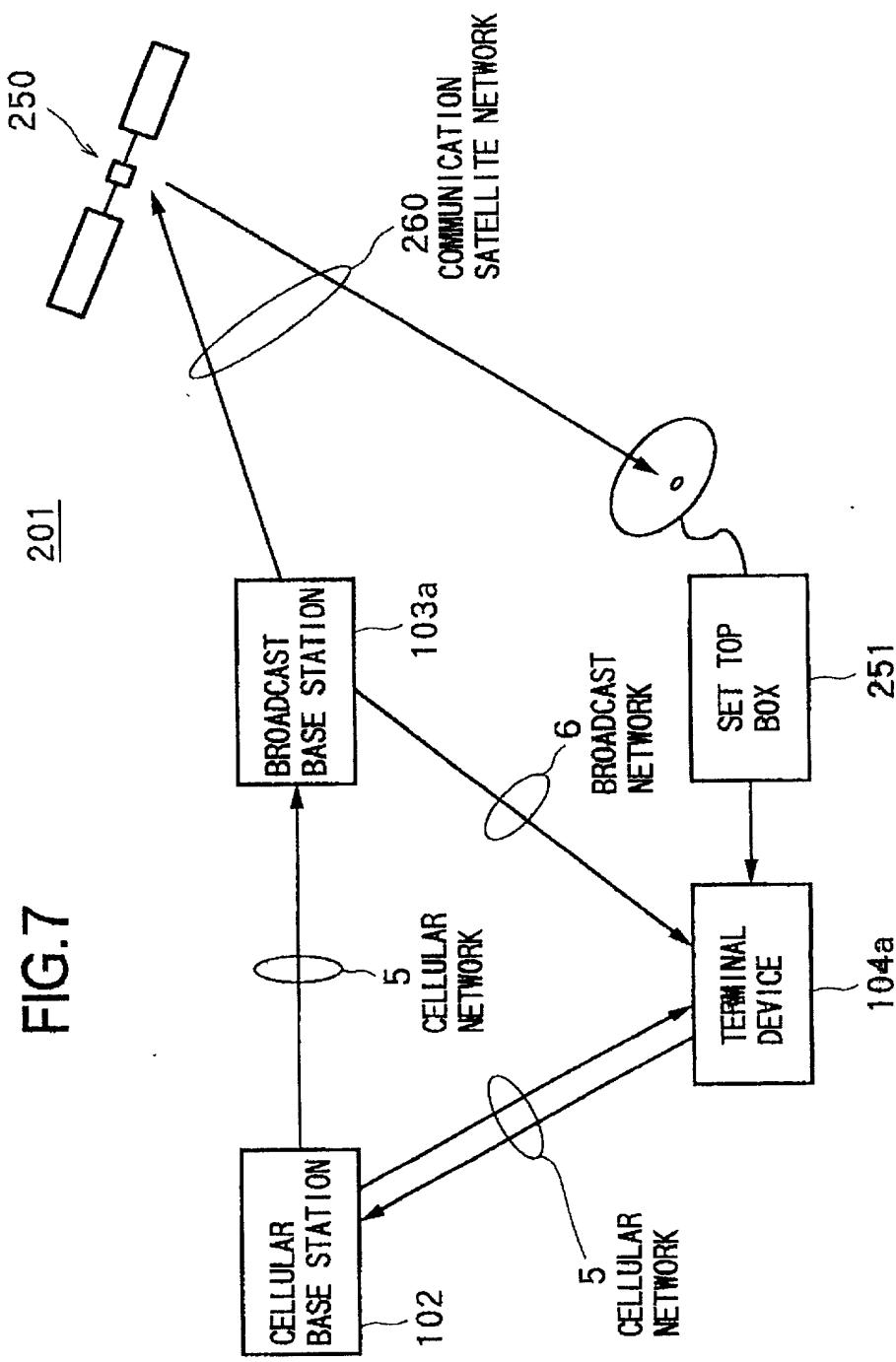
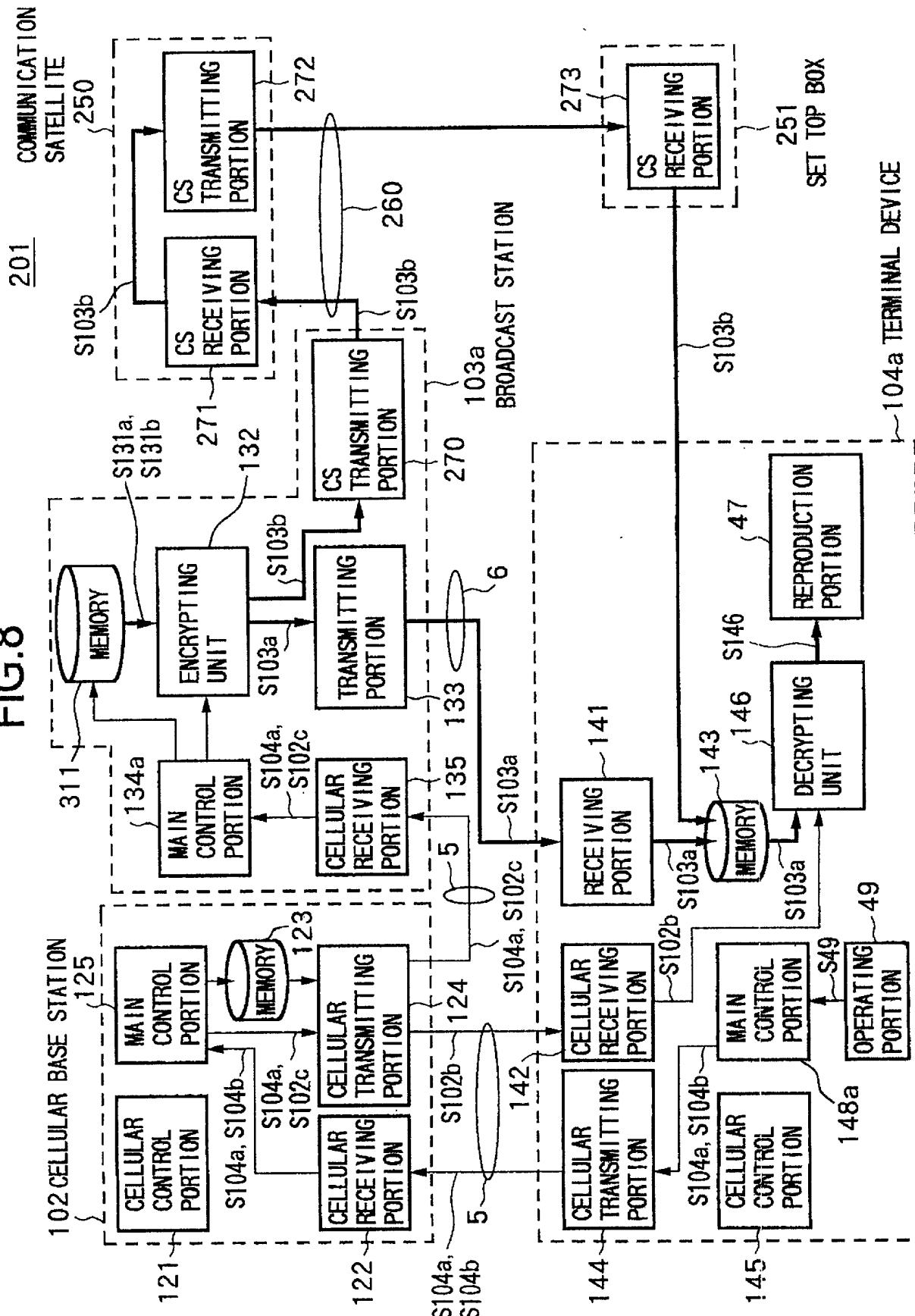


FIG.8



DECLARATION FOR PATENT APPLICATION (JOINT OR SOLE)

(Under 37 CFR § 1.63; with Power of Attorney)

FROMMER LAWRENCE & HAUG LLP

FLH File No. 450100-02333

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention ENTITLED:

COMMUNICATION APPARATUS, COMMUNICATION SYSTEM, AND METHOD OF THE SAME

the specification of which

is attached hereto.

was filed on _____ as Application Serial No. _____,

with amendment(s) through _____ (if applicable, give dates).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Sec. 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s) [list additional applications on separate page]: Priority Claimed:

Number:	Country:	Filed (Day/Month/Year):	Yes	No
11-031877	Japan	9 February 1999	<input checked="" type="checkbox"/>	<input type="checkbox"/>

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code § 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Sec. 1.56, which became available between the filing date of the prior application and the national or PCT international filing date of this application:

Prior U.S. Application(s) [list additional applications on separate page]:

Appln. Ser. Number:	Filed (Day/Month/Year):	Status (patented, pending, abandoned):
---------------------	-------------------------	--

I hereby appoint WILLIAM S. FROMMER, Registration No. 25,506, and DENNIS M. SMID, Registration No. 34,930 or their duly appointed associate, my attorneys, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to file continuation and divisional applications thereof, to receive the Patent, and to transact all business in the Patent and Trademark Office and in the Courts in connection therewith, and specify that all communications about the application are to be directed to the following correspondence address:

WILLIAM S. FROMMER, Esq.
c/o FROMMER LAWRENCE & HAUG LLP
745 Fifth Avenue
New York, New York 10151

Direct all telephone calls to:
(212) 588-0800
to the attention of:
WILLIAM S. FROMMER

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

INVENTOR(S):

Signature: _____ Date: _____

Full name of sole or first inventor: Mitsuhiro SUZUKI
Residence: Chiba, Japan
Citizenship: Japan

Signature: _____ Date: _____

Full name of 2nd joint inventor (if any): Kazuyuki SAKODA
Residence: Tokyo, Japan
Citizenship: Japan

Signature: _____ Date: _____

Full name of 3rd joint inventor (if any):
Residence:
Citizenship:

[Similarly list additional inventors on separate page]

Post Office Address(es) of inventor(s):

[if all inventors have the same post office address]

Sony Corporation

7-35 Kitashinagawa 6-chome
Shinagawa-Ku, Tokyo 141, Japan

Note: In order to qualify for reduced fees available to Small Entities, each inventor and any other individual or entity having rights to the invention must also sign an appropriate separate "Verified Statement (Declaration) Claiming [or Supporting a Claim by Another for] Small Entity Status" form [e.g. for Independent Inventor, Small Business Concern, Nonprofit Organization, individual Non-Inventor].

Note: A post office address must be provided for each inventor.